THE CONTENTIOUS POLITICS OF DISRUPTIVE INNOVATION:

VAPING AND FRACKING IN THE EUROPEAN UNION

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List of abbreviations

ALDE	Alliance of Liberals and Democrats
ASH	Action on Smoking and Health
CPE	Comparative Political Economy
DNA	Discourse Network Analyzer
DG	Directorate General
EC	European Commission
ECITA	Electronic Cigarette Industry Trade Association
ECR	European Conservatives and Reformists
EFA	European Free Alliance
EFD	Europe of Freedom and Direct Democracy
EHN	European Heart Network
EIA	Environmental Impact Assessment
ENSP	European Network for Smoking Prevention
ENVI	The European Parliament's Committee for Environment, Public Health, and Food Safety
EP	European Parliament
EPHA	European Public Health Alliance
EPP	European People's Party
ERS	European Respiratory Society
EU	European Union
EUL/NGL	European United Left/Nordic Green Left
FCTC	Framework Convention on Tobacco Control
FoEE	Friends of the Earth Europe
FWE	Food and Water Europe
GPSD	General Product Safety Directive
GWP	Global warming potential
HEAL	Health and Environment Alliance

HVHF	High volume hydraulic fracturing
IEA	International Energy Agency
IG	Innovation governance
IOGP	International Organization of Oil and Gas Producers
IR	International Relations
IPCC	Intergovernmental Panel on Climate Change
IPE	International Political Economy
ITRE	The European Parliament's Committee for Industry, Research and Energy
JRC	European Commission's Joint Research Centre
LNG	Liquefied Natural Gas
MEP	Member of the European Parliament
MDD	Medical Devices Directive
MS	European Union Member State(s)
NCP	Nicotine-containing products
NGO	Non-governmental organizations
NPM	New Public Management
NRT	Nicotine replacement therapies
P2P	Peer-to-peer
PMI	Philip Morris International
PPD	Pharmaceutical Products Directive
R&D	Research & Development
S&D	Alliance of Socialists & Democrats
SCENIHR	Scientific Committee on Emerging and Newly Identified Health Risks
SFP	Smoke Free Partnership
SG	The European Commission's Secretariat General
SNA	Social network analysis
STP	Smokeless tobacco products

STS	Science and Technology Studies
TA	Technology assessment
TPD	Tobacco Products Directive
TRA	Technical risk analysis
TVECA	Tobacco Vapor Electronic Cigarette Association
TW	Totally Wicked
UK	United Kingdom
U.S.	United States
WHO	World Health Organization
WWF	World Wide Fund for Nature

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Declaration

I confirm that the submitted work contains neither material from any prior theses nor any material that has already been published. The thesis is my own work submitted (through the Erasmus Mundus Joint Doctorate in "Globalization, Europe, and Multilateralism") for the degrees of PhD in Politics and International Studies at the University of Warwick and PhD in Political and Social Sciences at the Université Libre de Bruxelles. I have not submitted this thesis for consideration elsewhere. Unless stated otherwise, all tables and figures are original.

Summary

This thesis investigates what it means to view disruptive innovation as a political problem. I take my point of departure in the tendency for controversial disruptions in heavily regulated sectors, such as electronic cigarettes or hydraulic fracturing, to open regulatory spaces by challenging established expectations about how they ought to be governed. In the wake of such disruption, policy actors with a stake in the matter engage in sensemaking and discursive contests to control the meaning of the innovations in order to close the regulatory spaces by aligning them with one set of laws instead of another. I study these contests in two recent legislative initiatives of the European Union to address the disruptive potential of e-cigarettes and fracking: the 2014 revision of the Tobacco Products Directive and the 2014 Commission recommendations on unconventional fossil fuels. The research draws on 51 interviews carried out with key policy actors during and after the policy debates. I bolster this with an analysis of policy documents, press releases and scientific studies, as well as a content and network analysis of position statements in newspaper articles. I find that the strategic use of rhetoric and framing plays an important part in creating, maintaining, and entrenching opposed coalitions in both policy debates. In both case studies, the policy solution is accompanied by deteriorating levels of trust among participants, leading coalitions to engage in strategies of venue-shopping to circumvent their opponents. This underscores the significant challenges there are for policymakers to address disruptions while maintaining legitimacy. The original contribution of the thesis lies in its novel conceptualization of disruptive innovation as a political problem, its application of micro-sociological approaches to the politics of expertise and European public policy, and its practical and theoretical suggestions for how to better study periods of disruption and govern through them.

PART 1

INNOVATION GOVERNANCE: THE POLITICS OF DISRUPTION

Chapter 1

Introduction: disruptive innovation as a problem for politics

What comes after the revolution is inevitably bureaucracy. Whoever wins the revolution builds a bureaucracy.

- Sean Parker, co-founder of Napster[1]

Every revolution evaporates and leaves behind only the slime of a new bureaucracy.

- Franz Kafka

1.1 Introduction

Let us begin with a puzzle: what do electronic cigarettes and hydraulic fracturing have in common? At first glance, not much. Electronic cigarettes, or e-cigarettes, are handheld electronic devices for vaporizing flavored liquids. E-cigarette users inhale the vapor, which normally contains nicotine, to mimic the experience of smoking. Hydraulic fracturing, or fracking, is a well-stimulation technique used in hydrocarbon exploration and production. The process involves the high-pressure injection of fracking fluid (proprietary mixtures of primarily water, sand, and chemicals) into underground rock formations in order to create fissures through which oil and natural gas can flow to

[1] The quote is from a panel discussion featuring Sean Parker with Jim Breyer and David Kirkpatrick at the 2011 Techonomy Conference in Tucson, Arizona. See: http://techonomy.com/conf/11-tucson/techonomic-revolutions/what-comes-after-the-revolution/, accessed October 26, 2016.

the surface. On the face of things, these two technologies seem very different, but if we scratch beneath the surface, a number of similarities appear. Most importantly, both e-cigarettes and fracking are examples of disruptive innovations taking place in highly regulated markets, and both innovations quickly became controversial, instigating intense political and regulatory debates. The aim of the dissertation is to probe this interaction between disruptive innovation and bureaucracy. To guide the investigation, I propose the following central research question: *how do disruptive innovations affect regulatory practices?*

Disruptive innovations are innovations that upset the status quo. They do so in various ways. In business theory, disruptive innovations are traditionally understood as innovations that initially take root in simple applications at the bottom of a market, but then rapidly improve until incumbents are displaced (Bower & Christensen 1995; Christensen 1997; Christensen & Raynor 2003; Downes & Nunes 2014). From business and management studies, the term has quickly found purchase in other academic fields, such as innovation studies (Fagerberg et al. 2013; Mazzucato 2013), sociology (Vollmer 2013; King & Pearce 2010), technology assessment (Cagnin et al. 2013), security studies (Dombrowski et al. 2002; Dombrowski & Gholz 2009), and law (Koopman et al. 2014; Dorbeck-Jung et al. 2011). Frequently used examples of disruptive innovation include the displacement of mainframes by personal computers, fixed-line telephony by cellular phones, chemical photography by digital photography, and physical media such as CDs and DVDs by digital media files. In this manner, disruptions completely alter the dynamics of competition within markets by introducing new products, new organizations, and even creating entirely new markets for goods or services that did not exist previously. For something to be truly disruptive, though, in the real sense of the

word, there should also be an element of breaking with existing conceptual frameworks, a reframing of problems and solutions, and a *significant societal impact* (Assink 2006, p.218). It is not enough for a disruption to make its mark solely within a well-defined, bounded area of the business world. Disruptions spill over boundaries, and make themselves felt in unexpected ways. They are *engaging*, they draw people in, they make people care (Vollmer 2013, pp.77–9).

Clearly, both e-cigarettes and fracking meet these demands of truly disruptive innovations. E-cigarettes have the potential to significantly reduce the harms of smoking. There is early evidence to suggest that they help people quit (Brown et al. 2014; Action on Smoking and Health 2014), and for those who make the switch with no intention of quitting, there are estimates that e-cigarettes are 95% less harmful than conventional cigarettes (McNeill et al. 2015). From meagre beginnings under a decade ago, the e-cigarette market is now a multi-billion dollar market with some analysts projecting a compound annual growth rate in excess of 20% until 2020 (Research and Markets 2016). Fracking, meanwhile, has set off an energy revolution, with some arguing that we are entering a new era of fossil fuel abundance (Helm 2012). Ten years ago, analysts agreed that the United States would remain a natural gas importer for the foreseeable future. Construction was under way on liquefied natural gas (LNG) facilities to ramp up imports. Now, the U.S. is on track to become a net gas exporter by 2018 (U.S. Energy Information Administration 2016), and the LNG facilities are being retrofitted for export (Zuckerman 2013). This has security implications too, as energy independence expands foreign policy options.

Both innovations, however, have also met fierce resistance. Anti-tobacco campaigners and medical and public health professionals have warned about the

uncertainty and risks of long-term use of e-cigarettes (Pepper & Brewer 2014), and anti-fracking campaigners and environmental and geological scientists have brought attention to contaminations of air and groundwater at fracking sites (Food and Water Europe et al. 2012), as well as substantial greenhouse gas emissions (Howarth et al. 2011). For most truly disruptive innovations, *engagement* becomes *controversy* very quickly. With controversy, inevitably, comes politics, particularly in the form of debates about the regulatory steps that need to be taken to address the challenges of the disruptions.

1.2 The Napster precedent

To better grasp the social and political dimensions of disruptive innovations, we can take a brief detour through the story of Napster, the first file-sharing service and a good example of a true disruption that raised regulatory challenges. Napster was developed by teenagers Shawn Fanning and Sean Parker, and it was initially released in June, 1999. Although there were already other networks that facilitated file-sharing on the Internet (such as IRC and Usenet), Napster was the first such service to focus on MP3 music files. The really disruptive aspect of Napster was its reliance on peer-to-peer (P2P) technology. Before Napster, the only way to download music on the Internet was if someone posted it on a webpage or attached it to an email. P2P networking made it possible for Napster users to directly access files on other users' hard drives, without them having to post anything online in the first place. Effectively, this eliminated the marginal costs of downloading and copying music. This propelled Napster to rapid success, quickly reaching a peak user base of 80 million registered profiles (Gowan 2002). But it also brought them in trouble with the music industry.

In early 2000, heavy metal band Metallica discovered that an unreleased demo version of their song, "I Disappear" from the upcoming Mission Impossible II soundtrack, was being played on the radio (United States Senate 2000). Upon tracing the source of the leak to Napster, Metallica discovered their entire back catalogue of music freely available over the file-sharing service. On April 13, 2000, Metallica became the first recording artist to sue a P2P software company. One month later, Dr. Dre, the rapper, became the second. Then in October, eighteen record companies, all members of the Recording Industry Association of America, brought to court the landmark intellectual property rights case in which Napster would be found guilty of contributory and vicarious copyright infringement.[2] As a result of the case, Napster could be held liable for copyright infringement carried out by users of their service and had to institute a number of policing measures to monitor their traffic. Struggling to comply with policing demands, and reeling from $26 million settlements with songwriters and music publishers, Napster filed for bankruptcy in May 2002.

By making platforms liable for the activities of their users, the ruling in favor of the record industry was a radical interpretation of copyright infringement. Eighteen U.S. law professors filed a very critical amicus brief on the ruling, arguing that the judges were effectively banning a revolutionary technology to protect the business models of the record industry (Litman et al. 2000). The irony of the case is that the ruling did very little to actually curb the prevalence of file-sharing. Imitator companies, such as Gnutella, Kazaa, and Limewire, followed in Napster's wake. They were also targeted by lawsuits and in some cases forced to shut down, but with the development of BitTorrent technology, a new P2P protocol, file-sharing services further decentralized and

[2] See *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004 (2001).

proliferated through online indexes such as The Pirate Bay. This newer breed of P2P had smaller footprints, making it easy for others to replicate the site and host copies or provide access through proxy websites.[3] Even after years of trying, copyright enforcement has had very little success in shutting down these sites permanently.

We can learn much about the social and political sides of disruptive innovation from the Napster case. Napster was significantly disruptive not only to the record industry, but to societal expectations about the costs of music and assumptions about copyright in general. Napster engaged people, causing them to organize and react even in domains we would not expect – it spilled over the boundaries between file-sharing, music, copyright, business models, internet use, and law enforcement. It has been single-handedly credited with bringing about the end of the "Album Era" in popular music. Business models were forced to change, regardless of the Napster court case rulings (McCourt & Burkart 2003).

As Napster fell in-between traditional notions of copyright enforcement and file-sharing, it required participants to interpret the disruption, to "make sense" of it by aligning it with terms, labels and categories drawn from their institutional and organizational environments (Weick 1995). The record industry had to demonstrate and persuade other parties that Napster was harmful to the health of the cultural establishment and that they were contributing to a clear breach of existing copyright laws. Napster, in their defense, had to convince the courts, regulators, and politicians that they were looking at a paradigm shift in the way music was consumed and distributed, such that traditional notions of copyright enforcement should not apply. We

[3] When moving to "magnet links" in 2012, the entire footprint of The Pirate Bay was reduced to just 90 megabytes, meaning it easily fits on any small USB key. See https://torrentfreak.com/download-a-copy-of-the-pirate-bay-its-only-90-mb-120209/, accessed October 28, 2016.

might say that Napster opened a *regulatory space* between the sets of existing laws applying to music consumption, copyright enforcement, and file-sharing. The opening of regulatory spaces is a general feature of disruptive innovations – they are both causes and consequences of the disruption. By shrewdly navigating, challenging, or circumventing existing regulatory frameworks, disruptions are often able to present more compelling value propositions to prospective users. At the same time, this very circumvention leads to public outcry, legal challenges, and political attention.

Regulatory spaces are not tolerated for long. They need to be filled in with a new set of laws, norms, and/or expectations. This is where *sensemaking* (Weick 1995) comes in, because there are no clear-cut answers as to which exact set of assumptions should be the ones guiding regulatory initiatives. The way policy actors and organizations come to understand what matters in these debates should be made the object of inquiry. Under different circumstances, we could easily imagine the Napster ruling going the other way. It was not a foregone conclusion that existing business models should be defended – nor, would many argue, was it the right one. In the struggle to make one set of laws apply and not the other, or in the struggle to introduce new laws, those with a stake in the matter are tasked with interpreting the disruption and convincing others, especially the regulators, that their view is the correct one.

The Napster precedent unfolded mostly through court cases, but that need not be the case for other disruptions. Some demand the attention of national parliamentary debates, some are discussed within the international organizations that govern the global economy, and some are left to groups of experts and scientists to work out. If most truly disruptive innovations do indeed open regulatory spaces that necessitate sensemaking, then we should care about how these disagreements are settled. Are there any general

tendencies in the way polities approach and deal with disruption? Who are the winners, who are the losers, and why? How do regulators decide who to listen to? Like the Napster case, the cases of fracking and e-cigarettes raise these types of questions. Should we value energy security and economic benefits over potential environmental and climate change harms? Should we value public health gains and the freedom to consume nicotine in less harmful forms over potential long-term risks or financial benefits to the tobacco industry? Which set of laws should apply, or do we need entirely new ones? Because disruptions challenge our expectations, sensemaking matters. Regulators need to be told what they are looking at. Much of this happens through the argumentation and discourse of the participants with a stake in the innovation.

1.3 Theoretical and methodological approach

While their empirically engaging and transformative qualities make it obvious why we should care about disruptive innovations, they are interesting on a more abstract, conceptual level too. To better appreciate the theoretical salience of disruptions, we could rephrase the central research question thus: *how do fast-moving innovations affect slow-moving institutions?* To clarify, I see the central research question introduced previously as a specific example of the second question introduced here. The clash between innovations and institutions speaks to big questions about governance, time, and technological and social change. For example: are our political arrangements holding us back from realizing the full potential benefits of new technologies? Or are they important safeguards that protect us from their worst harms? Are certain new technologies exceeding the limits of our capacities to comprehend and control them? Or

is the bureaucracy a fundamental pillar for providing the stable rules that allow innovations to flourish?

There is a general tendency to view the public sector as slow-moving and inefficient and the private sector as fast-moving and dynamic. In this standard narrative, the public sector can only get in the way of market actors, who are best left to their own devices in the search for entrepreneurial breakthroughs. This account has been challenged countless times in various disciplines (see for example: Weiss 1998; Vogel 1996; Rao 2009; Lundvall 1992; Nelson 1993; Braczyk et al. 1998; Blind 2012; Fagerberg et al. 2013; Mazzucato 2013; Ornston 2012; Newman 2008). States and bureaucracies are important partners in the supply of innovation, for example by funding basic research, aligning investments towards specific goals and objectives, creating new markets and regulating their activities, and so on. In this study, I similarly subscribe to the view that innovation and regulation are co-created through cycles of mutual interaction, and to prioritize one at the expense of the other is both bad policy and bad theory. By ignoring their interaction, we forego the opportunity to imagine a more ambitious role for policy while sustaining a false notion of markets as separate and insulated from politics and society.

Having said that, institutions are what give the social world the appearance of structure, and as such they are endowed with some degree of permanence and resilience in the face of change (Berger & Luckmann 1968). Innovations, being novel ways of doing things, cannot help but collide with the stable institutional order. What we see in cases of disruptive innovations as political problems are particularly severe examples of this. Institutions are challenged in minor ways all the time, but they are generally upheld through routine repair activities: rule-breaking is followed by warnings and sanctions.

This works when social participants share a common set of institutions, understood as the range of settled habits, expectations, rules and assumptions, both formal and informal, that guide behavior and interaction in a certain societal domain. What disruptions do is that they "punctuate" this cooperation in maintaining institutions – and that applies to any form of disruption, from minor social awkwardness, to terrorist attacks, to disruptive innovations (Vollmer 2013). When institutions are punctuated, they are momentarily made unstable, questioned, negotiated, and then challenged or upheld. The thesis demonstrates how the disruptive innovations of e-cigarettes and fracking likewise punctuate the established institutions that shape their respective worlds, dramatically altering the "rules of the game" (North 1990, p.3).

We can find examples of disruption in micro-sociological accounts, and some of the best include Goffman's (1963; 1971) "breaching" experiments that examined people's reactions to violations of commonly held norms, Garfinkel's (1967) demonstrations of the "background expectancies" that guide any social interaction, and Milgram's (1974) infamous "obedience experiments". In all of these accounts, disruptions initiate a search and a scramble to re-establish meaning and re-orient institutions through intersubjective negotiation and interaction. The obedience experiments, meanwhile, show that disruptions are ignored if authority figures carry on as if nothing is out of the ordinary. In common is the underlying theme that social signaling is pervasive during periods of disruption and critical to how meanings are re-established. In accounts of social order and cooperation during and after disasters, the same empirical tendencies are identified, for example in Weick's (1990b; 1993) work on the Mann-Gulch fire and the Air Tenerife disaster and Murakami's (2000) description of the Tokyo subway sarin gas terrorist attack. These accounts all

demonstrate the thickness of social context, the "world-as-meaning" (Merleau-Ponty 1962), that is brought to the fore by disruption – normally in the background, disruptions force us to confront and negotiate the assumptions and institutions that structure our everyday lives. We can use these exact micro-sociological insights to productively study how policy actors make sense of disruptive innovations and negotiate regulatory responses *during* periods of disruption. It is within this period between the onset of disruptiveness (where the regulatory space is opened) and the eventual normalization of a disruption (by aligning it with a certain set of new or existing institutions through sensemaking and negotiation) that the politics of disruption take place and where the dissertation is focused.

1.3.1 Case selection

E-cigarettes and fracking are both case studies where there are rich opportunities to observe the politics of disruption. As previously mentioned, both are truly disruptive technologies that have the potential to transform entire sectors and spill over into other areas of society. Not only are e-cigarettes expected to dramatically change the composition of the tobacco market as consumers switch to less harmful products, they could also prove a monumental public health gain. And fracking has upended the prevailing notions about fossil fuel abundance and energy security. As such, both disruptions have challenged the expectations and institutions that used to govern a range of markets and industries, including tobacco, nicotine replacement therapy products (the Nicorette range of inhalers and chewing gum, for example), natural gas, other hydrocarbons such as oil and coal, and so on. More conveniently for my purposes here, both e-cigarettes and fracking are disruptions that affect heavily regulated sectors of the economy, meaning that there is a dense regulatory and institutional architecture with

which to collide. Being old, established, and well-understood sectors prior to the disruptions, e-cigarettes and fracking are that much more interesting for overturning and invalidating what was believed to be relatively settled and stable domains. In addition, both innovations were also targeted recently and directly by European Union-level legislation: e-cigarettes in Directive 2014/40/EU (European Commission 2014b), and fracking in Recommendation 2014/70/EU (European Commission 2014a).[4] Henceforth, I will refer to Directive 2014/40/EU as the Tobacco Products Directive, or TPD, and to Recommendation 2014/14/EU as the fracking recommendations or guidelines. What both of these cases demonstrate is an opening of regulatory spaces and subsequent sensemaking on the part of policy actors, putting forward their various understandings of the disruptions in an effort to normalize and align them with a new set of rules. I will provide a brief overview of how both cases developed so their relevance will be made clear.

E-cigarettes came on to the policymaking agenda of the EU gradually, incrementally through the routine regulatory activities taking place within the Directorate General for Health and Food Safety (DG Sanco). First flagged as "novel tobacco products" in 2004 in a commissioned study carried out by a consortium of non-governmental organizations (NGOs) (ASPECT Consortium 2004), e-cigarettes gradually received increasing amounts of attention in the run-up to the planned revision of the 2001 Tobacco Products Directive. But it was not until the publication in 2012 of the Commission's proposal for what a revised TPD would look like that e-cigarettes

[4] The proper titles of the legislative documents are as follows: For the TPD, "Directive 2014/40/EU of the European Parliament and of the Council of 3 April 2014 on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products and repealing Directive 2001/37/EC", and for fracking the "Commission Recommendation of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (such as shale gas) using high-volume hydraulic fracturing".

rapidly became the most contentious item among the many suggested provisions. DG Sanco was proposing to regulate all e-cigarettes above a threshold of 4 mg/ml of nicotine content as pharmaceutical products, meaning that essentially the entirety of the current e-cigarette market would be made illegal until the products passed the clinical trials of the respective Member States' medicines regulators. This brought the ire of e-cigarette companies, mostly small and medium-sized enterprises with no relation to the tobacco industry, as well as "vaping" groups (e-cigarette enthusiasts) who challenged the Commission's notion that medicalization was in the societal interest. Public health and tobacco control NGOs pushed back against the e-cigarette companies and users, citing the lack of long-term studies and manifold uncertainties about the risks and benefits of vaping. The action mostly unfolded in the European Parliament, with the decisive moment being a dramatic vote in favor of un-medicalized e-cigarettes. With this mandate from Parliament, the TPD's chief rapporteur, Linda McAvan (Member of the European Parliament [MEP] for the Socialists & Democrats) negotiated a compromise solution during the trilogue phase with the Commission and European Council that left e-cigarettes below 20 mg/mL un-medicalized, while those above the threshold would be treated as pharmaceutical products.

Fracking, in contrast to e-cigarettes, exploded onto the public radar through high-profile activism, campaigning, and media attention. The American documentary *Gasland* (Fox 2010) in particular made fracking an issue of high public concern and an instant target for green groups. Riding on this wave of public concern, environmental NGOs and Green/European Free Alliance MEPs made fracking a topical and controversial issue in Parliamentary debates. Reacting to this pressure from Parliament especially, the European Commission conducted a number of studies during 2012 to

assess the possible impacts of fracking on the environment, the climate, and energy markets. In 2013, the Commission's work program included an objective to come up with "an environmental, climate, and energy assessment framework to enable safe and secure unconventional hydrocarbon extraction" (European Commission 2012a). The dossier fell to DG Environment, although the Commission was split between variously highlighting the environmental, climate, energy, and competitiveness aspects of fracking. DG Environment's impact assessment was clear in calling for a binding Directive to regulate unconventional hydrocarbons (European Commission 2014c), but facing internal pressure from the other services, as well as a rejection of the impact assessment from the Commission's review board, DG Environment toned down their regulatory response and proposed a set of non-binding recommendations instead. The policy processes in the fracking case involved heavy influence from the oil and gas sectors as well as environmental groups, and key developments in the wider political arena of the EU also made an impact on the evolution of the issue.

In both the fracking and the e-cigarette case, we witness the opening of regulatory spaces and the subsequent closing of them as policy actors settle on a new understanding. In the case of e-cigarettes, the question was whether they could even be considered "tobacco products" as their functioning was so different from conventional cigarettes. A space was opened between the Directives for General Product Safety (2001/95/EC), Pharmaceutical Products (2001/83/EC), Medical Devices (93/42/EC), and Tobacco Products (2001/37/EC) – e-cigarettes could conceivably fit into any (or none) of these categories, and policy actors had strongly contrasting opinions about which was the most appropriate regulatory framework. In the case of fracking, a dizzying array of Directives were suggested as pertinent to the issue, ranging from

environmental impact assessment, to mining waste, to chemicals, to conservation.[5] In making their case to the regulators, their peers, and the public, policy actors variously emphasized some aspects of the innovations over others, and put forward different interpretations of what was at stake and why. This is what I mean by sensemaking, and we can study the subsequent negotiations of different interpretations of the innovations as examples of *framing*, which is a term used extensively within branches of political science, psychology, and sociology to indicate that the way pieces of information are communicated and received carries important social and political consequences (Goffman 1974; Entman 1993; Zaller 1992; Atikcan 2015; Baumgartner & Mahoney 2008; Benford & Snow 2000; Tversky & Kahneman 1981). The analysis of the case studies draws heavily on insights regarding the dynamics and implications of framing, which I will delineate in more detail in the theoretical chapters.

The dissertation is a comparative case study set in the European Union (EU). This is the setup that is most conducive to initially drawing out the politics of disruption and investigating its general tendencies. Given the novelty of the research area I engage with, the purpose of the project leans more towards the development of new theory than the testing of existing ones. Building theory on case study research is appropriate for research areas where prior literature or past empirical observation seems lacking (Gerring 2004). Eisenhardt (1989) argues that within-case analysis should be complemented by cross-case analysis to look for patterns that transcend the initial impressions of a single case. Additional cases can also serve as replication to confirm,

[5] A note from Janez Potocnik (the Environment Commissioner at the time) to the Parliament's Committee on the Environment, Public Health, and Food Safety lists the following specific directives: Environmental Impact Assessment (85/337/EC), Mining Waste (2006/21/EC), Water Framework (2000/60/EC), Chemicals (REACH) (1907/2006/EC), Biocidal Products (98/8/EC), Seveso II (96/82/EC), Habitats (92/43/EC), and Environmental Liability (2004/35/EC) (see Potocnik 2012).

extend or sharpen theory. For the present research project, it is important to ensure that findings pertaining to the fracking case, for instance, are not idiosyncratic to that case, but reflect the more general phenomenon of regulating disruptive innovation.[6] Therefore, having two cases from the same population is justified through replication logic, while their internal variation on secondary dimensions (such as the binding Directive versus non-binding Recommendation or the initial degree of public exposure and attention) allows for greater flexibility in cross-case analysis to extend the emergent theory (Eisenhardt 1989, p.537). When the same set of questions are asked of each case, we can engage in structured, focused comparison (George & Bennett 2005) that has the capacity to surprise us with its answers and provide insights we could not get from a single case.

The EU is an ideal setting for the case studies for several reasons. Transnationality matters in disruptive innovation. Markets, supply chains and corporate structures increasingly span national boundaries. It is becoming less and less feasible to insulate national industry from global competition. A disruptive innovation that upsets the status quo of an industry will, regardless of where it occurs, quickly permeate the sector on a global scale. Regulatory responses are therefore under increasing pressure to operate transnationally. The EU's single market is the most heavily regulated transnational market in the world, and therefore a prime location for the study. Its multi-level opportunity structure provides an abundance of access points for organized interests to influence the policy process (Richardson 2000). In addition to this, Brussels is notorious for the massive presence and policy influence of lobbyists (Woll 2008; Woll 2012; Mahoney 2008). Transparency International (2015), in a recent analysis of

[6] Eisenhardt (1989, p. 541) suggests that "the juxtaposition of seemingly similar cases by a researcher looking for differences can break simplistic frames".

EU lobbying, estimates at least 25,000 lobbyists working full-time in Brussels spending at least €1.5 billion each year. When disruptive innovation changes the rules of engagement for an industry, we can be sure that the industry's lobbyists will want to influence how the rules should be rewritten. Furthermore, regulators will often not know how to proceed with re-regulating novel activities in complex industries, and they will have to turn to lobbyists to understand what is going on (Woll 2008; Radaelli 1999a). This is especially true of the policy problems of disruptive innovations that are frequently complex and controversial. To address them, regulators draw on these external networks to gain the necessary *expertise* and *legitimacy* for their policy proposals.

All of this suggests that a disruptive innovation will empower transnational networks of experts, lobbyists or professionals (who possess insider knowledge of the highly technical and uncertain nature of the newly created market) to influence the process of re-regulation, frequently at the expense of domestic actors (Seabrooke 2014; Madsen 2014; Drezner 2007; Djelic & Sahlin-Andersson 2006; Quack 2007). These networks will be transnational in nature to reflect the transnational activities and markets of the industries they represent. This means that they operate outside the auspices of domestic state apparatuses, and they will seek their goals through transnational fora, bodies or regulators. Seabrooke (2014) suggests that transnational environments are "thin" compared to "thick" domestic environments. Domestic environments are more densely populated by institutions and work is more clearly separated into well-controlled jurisdictions (Abbott 1988). In contrast, the transnational environment is more open to professional competition, which means that lobbyists may have an easier time attaining their goals at the transnational level. For these reasons, to

gain the most traction on the research agenda outlined here, it would be most fruitful to hone in on the activities of regulators, lobbyists, and others as they compete in the transnational environment to control the politics of disruption.

1.3.2 Methods and data

Quantitative analysis is well-suited to theory-testing of a large number of cases, but when we are dealing with uncharted territory, it is more advisable to go deep rather than wide, and provide more case-specific detail through narrative approaches. Because the research question guiding this investigation starts from a question of "how", it increases the potential of the research to challenge existing assumptions about taken-for-granted causal relationships and relations of power (Foucault 1982). This leads to the development of more interesting insights and theory (Sandberg & Alvesson 2010). Asking "how" questions also leads one naturally into the exposition of narrative. In order to answer questions of how social life unfolds, it is necessary to investigate and interpret the "effects of social phenomena … in relation to process" (Flyvbjerg 2001, p.136). Process takes precedence over outcome. Events have to be put in proper order and the links from one to the next examined. Actors should be placed both in time and in relation to events (Abbott 2001d). Narrative is central to building understanding of complex cases through the "thick description" (Geertz 1973, p.6) of events as understood and experienced by the subjects of the study. As the study is concerned with novel and poorly understood phenomena, it is of the utmost importance that we make as few assumptions as possible and let the reality emerge out of focused attention to detailed practices and events. Only after this step has been completed do I turn to equally important questions of why, and bolster this account by drawing on qualitative computational methods to balance the experience-near immersion in the field with more

experience-distant analysis and interpretation (Geertz 1974). What this means in practice is that I begin with interviews to get a better sense of what is going on in the field, and follow up with content and network analysis of press articles to corroborate, supplement, and extend the exploration of the cases.

To focus on narrative and events as experienced by the subjects of the study seems a prudent choice when investigating complicated policymaking processes, especially in the EU: "In a polity characterized by contested institutional competencies, multiple, competing constituencies, and supranational actors vying for legitimate claims of representation, policy-making dynamics cannot be easily deduced from given political alignments or interest configurations" (Daviter 2009, p.1136). Much of the analysis is therefore informed by first-hand interpretation of primary interview data and documentary records. The data collection process commenced with desk research on the regulation of e-cigarettes and fracking in the EU. I primarily targeted the collection of documents on the EU institutions' websites, where all policy documents are publicly available. Of specific interest were stakeholder consultations, scientific studies (both internal and external), impact assessments, expert opinions, press releases, memos, draft proposals, legislative texts, and fact sheets. Drawing on these and newspaper articles made it possible to identify a number of key interviewees who were approached with a similar set of open-ended questions. Interviews were primarily conducted in person, resorting to Skype and telephone if the interviewee was not in Brussels at the time of investigation. Rather than record the interviews, it was found more expedient to take notes in hand during the interview, allowing interviewees to speak more freely about these controversial issues. Several expressed their preference for this interview format, especially considering the sometimes sensitive contents of the discussion. In total, 51

interviews were carried out; 24 with e-cigarette policy actors and 25 with fracking actors, and a further two with people who had much experience on the European lobbying scene in general. An overview of the interviewees and their organizational affiliations can be found in Appendices 1, 2, and 3.

Interviews proceeded in the semi-structured format: a core set of questions provided a script to each interview, but the conversation was allowed to run its natural course to allow interviewees to bring up their own interpretation of events and draw attention to different details. This setup also made it easier to identify differences in how events were framed by participants. This interview style has been described as the "romantic" approach, where the purpose is to establish rapport with the interviewee in order to elicit confessional data (Alvesson 2003; Roulston 2010). The assumption is that this conversational style makes it possible for the interviewer to develop an understanding of the interviewees' beliefs, attitudes, perspectives and opinions. Immediately following the conclusion of each interview, more detailed field memos were written to preserve the details of the interview and allow for some immediate reflection on the analytical relevance of the contents.

Interview quality was assured in three ways following recommendations in the literature (Roulston 2010, p.206): through the triangulation of data with other interviews and documents, by running multiple interviews with key interviewees in order to build the relationship and establish trust, and through the longevity of the fieldwork, which took place over 10 months in Brussels (September 2014-June 2015). The interview manual and core questions evolved as fieldwork progressed. New issues and perspectives were identified that warranted closer attention. New interviewees were identified by snowball sampling, in which key policy actors are identified by focusing

on those persons who tend to be nominated by most of their peers (Farquharson 2005). By looking at patterns in who was nominated by whom and comparing with the interview data, a distinct sense of the different camps and contending frames also emerged. Chapter 8 bolsters the account with a network analysis of frame usage in press statements, but the methodological details of the treatment will be presented within that chapter. As mentioned, the logic of employing a range of tools is that it helps boost explanatory power while producing a more complete picture of these novel and complicated cases.

1.4 Plan of the dissertation

The dissertation is organized into two parts. Part 1, "Innovation Governance: The Politics of Disruption", takes a more conceptual approach to the research question, both placing the main themes within the literature and reflecting on the theoretical issues raised. The purpose of Part 1 is to sketch out the terrain of a new research program concerning the regulation of disruptive innovation. As such, I cover a broad range of literature within innovation, politics, and sociology in order to provide the fullest possible picture of the contents and inter-linkages of this program. I also argue that this interdisciplinary dialogue is necessary if we are to do justice to the multi-faceted nature of disruptive innovation and how it relates to and interacts with politics, organizations, and societies.

Following this introductory chapter, Chapter 2 is concerned with how disruptive innovations become political problems in the first place. Not all disruptions are politically salient, and they do not all challenge regulators in the same ways. The chapter argues that when disruptions are complex, controversial, novel, and fast-

moving, regulators have no choice but to deal with their political ramifications, but they are simultaneously placed in very poor positions to do so. This phenomenon can be usefully compared to a so-called "Collingridge dilemma", an idea that was first put forward within the technology assessment literature over thirty years ago. The dilemma describes a double-bind problem facing those who wish to control or steer the direction of technological developments: an information problem (we do not know enough to act) and a power problem (but we need to act now to have any chance of influencing the technology).

If Chapter 2 thus lays the conceptual and definitional groundwork for even making it possible to study disruptive innovations as political problems, Chapter 3 builds on this by looking at different perspectives on *how* we ought to study them. The chapter is organized into two opposed perspectives on the relationship between innovation and policy. In the "Innovation Politics" section, I take the perspective of innovation studies looking at policy systems. I argue that innovation studies, while showing an appreciation for the role of politics in innovation processes, falls short when it comes to treating disruptive innovation as a distinct political problem. I label this unaddressed area of investigation as "innovation governance", defining it as the study of how to manage the political and societal implications of innovation, especially as they play out within individual cases of disruption and re-alignment between markets and bureaucracies. In the "Politics of Innovation" section, I take the perspective of political science looking at innovation. Here, I discuss the changing role of the state in influencing and regulating economic activity, including innovation. I trace the rise of the regulatory agency as a key institution in contemporary capitalism, arguing that innovation governance is centered on the regulatory agency. By juxtaposing these two

perspectives on the innovation-policy relationship, I can argue that there is a gap within innovation politics that we can fill with the politics of innovation.

Chapter 3 tells us more about who the specific actors are within innovation governance, but it does not tell us much about how social interaction unfolds *during* periods of disruption. That is the task for Chapter 4. I begin by returning to the concept of Collingridge dilemmas to argue that instead of worrying about how to solve such dilemmas, we should ask about the consequences of viewing disruptive policy problems as dilemmas in the first place: what are the practices such dilemmas permit, produce, or elicit? Viewing Collingridge dilemmas as opportunities for sensemaking inescapably leads actors to engage in framing contests, both over the construction of issues and their resolution. I therefore consider framing theory in more depth, and hone in on the micro-sociological dimensions of framing contests, drawing heavily on Goffman and Vollmer. This constitutes the primary theoretical apparatus that lets us view framing as a dynamic, intersubjective process (rather than frames as static variables) that structures the politics of disruption. Chapter 4 concludes the first part of the dissertation.

In part 2, "Vaping and Fracking in the European Union", I direct my attention towards the case studies. The chapters in this part are organized according to the stages of the "issue life cycle" (Downs 1972; Morin 2011), the idea being that policy issues evolve through distinct temporal stages. In the *expansive stage*, policy debates arise when issues are brought to the attention of policymakers. This is the subject of Chapter 5. In the *transformative stage*, issues are negotiated through interactions between policymakers, experts, and stakeholders as different perspectives on the problem and its resolution are contested. I look at this stage in Chapters 6 and 7. Finally, in the *contractive* stage after concrete policy options are settled upon, the issue gradually

leaves the political radar and actors re-organize according to the new reality. Chapter 8 investigates this stage, but more importantly, it develops a methodology for viewing the evolution of each policy debate throughout the entire issue life cycle. I will say a few things about each of the chapters here.

In studying how e-cigarettes and fracking first got the attention of EU policymakers, Chapter 5 underscores the importance of first impressions, which is another way of saying that the outcomes of preliminary framing contests matter for the onward trajectories of the cases. The chapter conceptualizes this as a question of increasing degrees of institutionalization through repeat iterations of first frames (for example, seeing a frame travel from protest placards, to Parliament speeches, to impact assessments, to policy proposals). I note an important difference between the two cases in the way first impressions mattered: in the e-cigarette case, the isolation and homogeneity of actors allowed first frames to institutionalize considerably, while in the fracking case, which was very public and contentious from the start, there was less scope for this to occur. Nevertheless, the anti-fracking and anti-e-cigarette agenda-setters were left with distinct advantages in both cases.

Chapters 6 and 7 make up a smaller set within Part 2 of the dissertation. Together, these chapters move the policy debate forwards by investigating in detail how the interviewees made sense of the disruptions and made strategic use of framing strategies to communicate their version of the story to other policy actors during the transformative stage. Chapter 6 focuses on *cognitive framing strategies,* those arguments that emphasize information and facts, typically associated with scientific and expert performances. The chapter begins by considering how disruptive innovations are constructed as risks, and then develops a typology of framing strategies according to a

relational understanding of risk. I rely on this typology to organize the empirical material. In this chapter, I look at prevention and precaution strategies. Prevention strategies emphasize what we know about the risks in order to argue in favor of the disruption and suggest ways to mitigate its worst externalities. Precaution strategies emphasize what we do *not* know about the risks to argue against the disruptions. The chapter concludes that the limits of cognitive framing are quickly reached in cases of disruptive innovation, owing to deeper-lying disagreements about the norms that should apply as well as mistrust between stakeholders. I refer to these normative and relational underpinnings as the "deep structure of the policy debate", which is the topic of Chapter 7.

Deep structures should be understood in a Weberian or Geertzian sense as the cultural "webs of significance" (Geertz 1973, p.5) that actors are suspended in – the idea being that to fully understand the motivations of people, we need to understand the *meaning* they attribute to their daily and professional lives. In Chapter 7, then, I uncover this meaning by considering both normative and relational framing strategies. Normative framing strategies include avoidance and acceptance approaches. Avoidance strategies reject the risks constituted by the disruption on normative grounds; acceptance strategies do the opposite. Essentially, normative framing strategies tell us about the participants' different views on desirable futures. The interviews provide evidence of highly intractable normative positions taken by the policy actors within each case study, to the extent that even complete information about the future consequences of the disruptions would do little to unify the opponents. This is a major blow to the naively held assumptions, still guiding many conventional approaches to risk and innovation politics, that purely technical and fact-based treatments can suffice.

In the relational framing strategies, I go a step further by analyzing relations of trust and mistrust between the policy actors. Finding no way to productively negotiate cognitive and especially normative tensions, relational framing strategies seem to function as a pressure valve that relieves the rising tensions in the debates with the result that relations deteriorate.

Chapter 8 takes a different tack to the previous empirical chapters by balancing their more "experience-near" analysis (close to the subjective life-worlds of the participants) with a more "experience-distant" (Geertz 1974) formalization of the policy debate as a whole through a combined content and network analysis of press statements. In other words, while the previous chapters focused more on filling out the contents of the framing strategies, here I am more concerned with their *mobilization*, that is, the way they travel between policy actors over time, and how this structures coalitions. I make use of the same typology of framing strategies that has been guiding the analysis throughout and code press statements by policy actors, expanding both the pool of participants and the sources of data. This lets me construct network diagrams of how actors and key concepts in the debates relate to one another during each of the stages. Chapter 8 supports the overall narrative that has been emerging out of each case study, but provides additional detail and an independent basis for comparison and confirmation of events.

A central finding is that owing to the deterioration of trust and the rising tensions within the policy debates, policy actors increasingly looked for ways to circumvent their opponents rather than engage them head-on. Both the pro-fracking and pro-e-cigarette coalitions relied on this strategy to outmaneuver the strategic advantages gained by the agenda-setting anti-coalitions. This resulted in two different varieties of

venue-shopping, which is the act of taking your politics to a different forum where you have a better chance of succeeding (Baumgartner & Jones 1993). Specifically, fracking proponents went “high and narrow” by going over the head of DG Environment to garner support among the European Council and other Commission services for a more technical and economic understanding of fracking. In contrast, e-cigarette proponents went “low and broad” by mobilizing public support among vaping communities to pressure the European Parliament. But both cases leave something to be desired for innovation governance, as the fracking outcome was criticized for technocracy, while the e-cigarette outcome was criticized for populism. Chapter 9 reflects on this and concludes with theoretical and practical implications, as well as identifying opportunities for future research.

1.5 Original contributions

The present study aspires towards three distinct goals or purposes: the thick description of empirical phenomena that are important in and of themselves, a contribution to the ongoing dialogue, and the development of middle-range theory. First of all, the case studies that have been selected are important political topics in the EU with ramifications for public health, environment, competitiveness and energy security. Greater knowledge of how these topics are being regulated and with what potential effects is important in and of itself. Building an understanding of how policy actors organize around these topics in this particular instance is valuable, and it creates an opportunity for contributing to the social and political dialogue (the second goal of the study). Insights from the analysis can be used to confront policymakers and question their choices, as proposals to how things can be done better, or they can be injected into

the policy debate through publication in scientific or non-scientific outlets. Narratives are uniquely well set up for policy relevance by "provid[ing] far better access for policy intervention than the present social science of variables" (Abbott 2001f, p.160).

The third goal of the study requires some preliminary remarks: to what extent can the findings be generalized to build theory about the politics of disruptive innovation? Flyvbjerg (2001) describes social science that emphasizes the particular over the general as *phronetic social science*, borrowing the term from one of Aristotle's three intellectual virtues: phronesis (prudence or wisdom). He argues that social science is losing relevance by aspiring to the same standard of epistemic knowledge (universal laws and theories about reality) that the natural sciences pursue. Rather than completely disavow theory, however, I embrace the recommendations that there is a space in between concreteness and generality to be filled by middle-range theory (Merton 1968) and analytic eclecticism (Sil & Katzenstein 2010). This is to say that within a limited set of comparable contexts, there is much value to be gained from seeking out intellectually and practically useful connections between different strands of scholarship and applying them to important real-world issues. In keeping with pragmatist philosophy the ultimate arbiter of the usefulness of theory should be the traction it offers on substantive issues, not its coherence with universal, abstract laws (Marres 2007; Sil 2000; Lamont & Swidler 2014).

The theoretical contribution of the thesis can be summarized as the application of sensemaking as a coordinating focus for studying the intersection of innovation, policy, and organizations. Regarding innovation studies, the thesis reverses the conventional relationship between policy and innovation, by studying how innovations become political problems rather than how policies contribute to innovative activity. In

particular, this involves pushing beyond the boundaries of technology assessment to engage with the discourse and strategy of policy actors and the moves they make during the policy process. This brings me into the territory of policy studies, where I contribute to the understanding of framing as a dynamic process driven by discourse coalitions. Furthermore, I demonstrate that the collision between fast-moving innovations and slow-moving institutions, given extant governance modes and practices, tends to produce either technocratic or populist outcomes that lead to deteriorating trust and venue-shopping. Regarding the sociology of organizations and professions, the dissertation contributes by showing how disruptions are understood in terms drawn from the institutional and organizational environments of actors while simultaneously presenting opportunities for the renewal, challenge, and re-alignment of these. All of these contributions are in part made possible by introducing the micro-sociological conceptions of sensemaking and disruption to the larger-scale processes of innovation and politics.

Overall, the dissertation demonstrates that current governance modes and practices for dealing with the regulatory problems of new technologies suffer from significant limitations. The following sentences provide a quick run-through of the argumentation of the entire thesis: Disruptive innovations become problems for politics when they open regulatory spaces. These spaces are opened because agenda-setters frame the disruptions in such a way that it becomes clear that existing frameworks do not entirely suffice to address the identified risks and problems that the technologies present. To the extent that the agenda-setters can overcome initial contestations to their framing, their particular understanding of the problem and its solutions are favored by policymakers initially. However, as the policy debates gain exposure and more

participants are drawn in, strongly opposed coalitions form and organize around contending sets of cognitive, normative and relational expectations. Due to the intractability of the disagreements and the lacking instruments or mechanisms in the policy process to deal with them, resolutions are rarely accommodated by the amalgamation of the competing coalitions into a consensus-building super-coalition. Instead, the opposed coalitions harden and look for ways to circumvent their opponents by seeking allies in other political forums and gaining leverage elsewhere to be used in the policy debate. As a consequence, trust deteriorates, and legitimacy takes a hit. To address this, innovation governance needs to stop trying to get policy "right" from the beginning, but instead lower the threshold both for participation and mistakes by allowing for experimentation and iterative policy construction within multi-stakeholder governance arrangements.

Chapter 2

How disruptive innovations become political problems

2.1 Introduction

In the previous chapter, I identified the research question guiding this study as follows: *How does disruptive innovation affect regulatory practices?*[7] The purpose of this chapter is to launch the investigation by considering how disruptive innovations become political problems in the first place. It is important to know what we mean by disruptive innovation and why they may be politically salient – and by extension, to understand what it is that makes some disruptions political and others not. This chapter is therefore focused on the conceptual and definitional groundwork that must be completed before we can look at *how* the relationship between disruption and regulation ought to be studied, which I deal with in Chapter 3. The next section hones in on the concept of disruptive innovation and considers its intellectual history and context. Following that, in section 3, I look at how the impacts of disruptive innovations play out differently in market versus regulatory settings. These initial sections set up the core argument of this chapter, namely that disruptive innovations become political problems when they are novel, fast-moving, complex and controversial. When they exhibit these characteristics, they can usefully be thought of as "Collingridge dilemmas", which I define and reflect on in Section 4. I conclude that the coming analysis be oriented around unpacking the

[7] Alternatively: How do fast-moving innovations affect slow-moving institutions?

processes of “sensemaking” (Weick 1995) that drive social interaction during the negotiation of Collingridge dilemmas.

2.2 Defining disruption

The idea of disruptive innovation can certainly be traced back to Marx, who noted “the violent destruction of capital not by relations external to it, but rather as a condition of its self-preservation” (Marx 1993, pp.749–50). This creative potential of destructive or disruptive economic forces was picked up on by Schumpeter (1943, pp.82–3), who called the process of creative destruction “the essential fact about capitalism”. More recently, the term has gained renewed traction through the management literature as the concept of “disruptive innovation”, which has become so ubiquitous in today’s business landscape that it is frequently dismissed as a meaningless buzzword (Yglesias 2013). Nevertheless, disruption today has become the “gospel of innovation” (Lepore 2014), in which “everyone is either disrupting or being disrupted”. There are disruption conferences (such as the popular Techcrunch Disrupt), disruption consultants (and the disruption *of* consulting), and disruption courses that you can take in universities or online (which is disruptive in itself). Technology startups today are expected to disrupt entire industries as a minimum in order to achieve success (Gelernter 2016). A term that was once negatively loaded, disruption now seems to be a focal point for orienting the competitive dynamics of countless industries.

This management infatuation with disruption was kicked off by Bower and Christensen in a 1995 article in the Harvard Business Review: “Disruptive technologies: Catching the wave”. Through a study of the computer disk drive industry in the 1980s, the authors make the distinction between sustaining technologies and disruptive

technologies. Sustaining technologies are those that provide incremental improvements to product characteristics that are already valued by customers. Disruptive technologies, on the other hand, introduce a different package of product characteristics to the one valued by mainstream customers, and initially these products tend to perform worse on a few key dimensions. At the outset, therefore, they are offered in smaller niche markets, where their specific characteristics are especially valued. Over time however, the products that rely on disruptive technologies improve at a quicker rate than the sustaining technologies of a mainstream market. This results in a previous niche product suddenly becoming mainstream when their value proposition exceeds that of earlier products.

The disruptiveness comes from the fact that most often, the incumbents do not see themselves as competing with the upstarts and are lulled into a false sense of complacency by their current market dominance. The example of the disk drive industry in the 1980s is telling: each time the diameter of disk drives shrank (from 14 inches to 8, then to 5.25, and finally to 3.5), the new technology was initially shunned by incumbents and left for new entrants to take advantage of until they dethroned the incumbents. In a series of follow-up books, Christensen and co-authors chart the same developments in a series of other industries and sectors (Christensen 1997; Christensen & Raynor 2003), and even into what some consider the terrain of public service delivery such as healthcare and education (Christensen et al. 2009; Christensen et al. 2011). This has led to criticism in the media about the limits and ethics of disruption, as well as the validity of the concept (Lepore 2014). Regardless, disruptive innovation remains one of the most widely cited and influential ideas in modern business.

Christensen gradually replaced the term "disruptive technologies" with "disruptive innovation", recognizing that it is the business model that matters more for realizing disruptiveness than the technology on which it is built (Christensen & Raynor 2003). Technologies in themselves are not inherently disruptive or sustaining – that depends on how they are utilized. This insight introduces a useful distinction between technology and innovation: disruptive technologies imply those technologies that present remarkably better or faster ways of accomplishing something. Disruptive innovations make use of disruptive technologies to present end-users with a product or service that is remarkably better than existing versions, thereby creating a new market or radically altering the terms of competition in existing ones (and often both). Innovations imply a market and a commercial motive, while technologies do not. As an example, GPS (global positioning system) is a disruptive technology, while Google Maps is a disruptive innovation. Technologies are more neutral and can be repackaged to meet different needs – innovations equal this repackaging into actual products or services with well-defined value propositions. Another way to put it is that disruptive technologies make it possible for new market opportunities to be developed, while disruptive innovations actually exploit those opportunities.

Disruptive innovations only become disruptive if they meet or create a demand. It is not enough to offer a compelling value proposition if there is no need or interest in it. Rao (2009) argues that radical innovations often flounder because their developers overlook the social and cultural mobilization needed to entice target customers into buying their product. Early adopters, what Rao calls market rebels, are instrumental in this regard. Market rebels are more than early adopters of an innovation, however. Disruptive innovations, by their very nature, challenge the status quo in terms of

interests, norms, values, practices and relationships. The social acceptance or rejection of an innovation is often dependent on the actions of activists who rely on "hot causes" and "cool mobilization" to organize their campaigns to support or protest an innovation (Rao 2009). Hot causes are those that inspire feelings of pride or anger, arouse to action, and create identity. In the early days of the personal computer, an example of a hot cause was the negative reaction against the tyranny of centralized computing. Cool mobilization is the generation of social experiences, communities of feeling, that create new behavior. Hobbyist computer clubs are an example of this. Together, hot causes and cool mobilization power collective action, and collective action creates or constrains markets. According to Rao, personal computers would have faced very different market conditions if it were not for the activities and campaigns of market rebels that convinced the public of the PC's benefits and drove social acceptance. Social rejection is equally important, as the case of the biotechnology industry in Germany shows. Activists reduced biotechnology to genetic engineering and connected it to Nazi eugenics programs. This forced German pharmaceuticals to abandon existing plants in Germany and move production abroad.

The idea of market rebels makes a broader point about disruptive innovation, namely: disruptive innovations do not occur in a social vacuum. Innovations are not judged solely on instrumental terms by objective arbitrators. They are subjected to social interpretation and construction. This is particularly the case when it comes to innovations that are more disruptive or radical as opposed to sustaining. By their very nature, they challenge established notions and expectations about the market in which they occur. This leads to highly emotional responses, as evidenced by Rao's (2009) "hot causes". The emotional reactions that disruptive innovations elicit means that they

frequently lead people to take on new roles and identities and band together in social movements aimed at challenging established orders (Rao et al. 2003). Another way to confirm the emotional dimension of disruptive innovations is to consider sociological research into social disruption (in which social norms and expectations are frustrated), for example Goffman's (1963) "breaching experiments".[8] These experiments provide ample intelligence to suggest that when expectations are frustrated, as they are by disruptive innovations, highly emotional responses are frequently seen. The frustration of not knowing how something turns out, be it a social situation or a new market innovation, is felt viscerally by participants, and this dimension of disruption is important to consider. This suggests that a core characteristic of disruptive innovations is that they increase uncertainty and violate established ways of doing things, both of which often makes them uncomfortable to deal with.

While the underlying disruptive technologies and their repackaging into innovative products provide the raw materials of a disruption, the battle to determine how the innovation is perceived is equally important. This is especially true when we consider that disruptiveness itself implies that existing expectations are not easily extrapolated in order to shape perception (Beckert 2013). We may therefore expect disruptions to initiate contentious battles over their meaning (Vollmer 2013). For example, are e-cigarettes a responsible way to enjoy nicotine, a device to quit smoking, or a stealthy, new revenue source for big tobacco? Is hydraulic fracturing an energy revolution or an environmental catastrophe? Battles to determine which "frames"

[8] In these experiments, sociology students were asked to disrupt everyday situations by, for example, standing closer and closer to someone with whom you are talking to the point where your noses touch, or behaving as lodgers in parental homes, or frequently asking for clarifications during normal conversation ("what do you mean?"). In all these experiments, the frustration of social expectations and norms frequently elicited highly emotional responses from the participants.

(Goffman 1974) are appropriate for establishing the meaning of disruptions have real societal consequences for their further development and ultimate impact. Disruptiveness itself should therefore be seen as a partially constructed attribute of some innovations – it is not enough to assume that cost and market dynamics are sufficient for explaining disruptions, although they are a necessary condition for disruptiveness to be functionally possible in the first place. Disruption therefore exists in the cyclical dynamic between technological and market movements and the social construction and contestation of those movements. For these reasons, we must also abandon any idea of an ultimate yardstick of disruption, as their social construction is inherently context-dependent and case-specific (Flyvbjerg 2001, pp.38–49). There is no specific analytical or objective threshold at which something becomes disruptive. Rather, disruption is a characteristic that is both real and constructed (cf. scientific "factishes", Latour 2010, pp.1–66).

So what exactly gets disrupted when we talk about disruptive innovations? According to Christensen, it is primarily markets that are disrupted, in the sense that new entrants challenge incumbents, changing the dynamics of competition and the scope for realizing economic returns. However, the discussion on the importance of interpretations and frames of disruptive innovations suggest that what gets disrupted before we even get to the stage of market impacts are *expectations*. This makes it possible to introduce an analytically useful distinction between disrupted markets and mature markets as dependent upon the degree to which market actors (including external observers and regulators) share similar expectations as to the future development of the market. In mature markets, such as oil and gas before hydraulic fracturing or tobacco before e-cigarettes, market actors thought they had a good idea of

what the market would look like in coming years, and even extending into future decades. This led to widely accepted theories such as "peak oil" and "the tobacco endgame". Peak oil states that we already know how much oil (and other hydrocarbons) is technically recoverable and how quickly we can get it out of the ground (Bardi 2009; Helm 2012, pp.138–54). Therefore, it is possible to extrapolate in order to assert that peak daily production has already been reached[9] or will be reached in the near future, after which it will slowly but surely taper off. The tobacco endgame theory extrapolates past and current smoking rates into the future, correlating them with tobacco control measures, thereby claiming that a world without tobacco (or with dramatically lowered smoking rates) is in reach in the near future (Warner 2013; Malone et al. 2014; Thomson et al. 2012). The disruptions of e-cigarettes and hydraulic fracturing severely challenged both of these theories and the expectations on which they rested. Thus, we are now faced with a world of abundant hydrocarbons (Helm 2012, pp.154–5) and e-cigarettes that threaten to "renormalize smoking" (Fairchild et al. 2014). Although both of these theories deal with the long term development of the market, it is important to point out that expectations govern both the short and the long term. As mentioned in previous paragraphs, short term uncertainties had to do with defining the *identities* of the new innovations. In other words, what do they mean and how do we understand them: as environmental threat or energy opportunity – smoking cessation or renormalization?

The focus on expectations opens the door to the sociology of disruption (Vollmer 2013), which claims that disruptions should be understood as instances of "punctuated cooperation", that is, frustrated exercises in maintaining expectations. The

[9] As has been predicted, wrongly, several times since the 1970s.

purpose then is to study the ways people interact in order to re-establish cooperation, which can be examined by demonstrating the theories that explain the empirical regularities by which this occurs. I return to these points in Chapter 4. For now, it is important to keep in mind that when the expectations of the public and regulators as to the nature and development of some markets gets frustrated, uncertainty and controversy follows, and regulators get tasked with addressing the problems and returning the market to a state of perceived normalcy. I investigate this in more detail in the next section.

2.3 Political and market consequences of disruptive innovation

Disruptive innovations require regulatory action, but regulators are not passive agents that simply acquiesce and respond to the market changes that disruptions bring about. Often, they are partners in defining the nature and legitimate uses of a disruptive innovation, and set the parameters for their further development. In fact, their involvement can be the single most decisive factor in making or breaking an innovation: they can create the institutions that give birth to, support and legitimate the market made possible by an innovation, or they can decide to block further development by banning the technology if its externalities are found too severe. Rao's (2009) market rebels may be influential in garnering public support or opposition to certain innovations, but regulators have the final word. Whether by 'hard' binding forms of legal instruments or 'soft' norms and standards, regulators play a critical role in defining the institutional arrangements of innovations (Mörth 2006; Higgins & Hallstrom 2007; Djelic & Sahlin-Andersson 2006). Clearly, that word partly depends on public opinion, but given their

central importance in defining the legal status of innovations, it is surprising that regulatory matters have not been given more attention in the study of disruptive innovations.

2.3.1 The importance of controversy

The first task is to more precisely define why disruptive innovations may demand regulatory attention. For disruptive innovations to be politically salient, they have to result in contentiousness – that is, they have to provoke argument. Typically, such arguments have their basis in either the consequences of the innovation or its process. In other words, an innovation may redistribute harm and benefit among societal groups, or the way it functions may be damaging to the environment, to human health, and so on. This makes it possible for some to question the permissibility or justifiability of certain innovations on moral grounds. But there is no objective standpoint from which such assessments can be incontrovertibly demonstrated. Early in the life of disruptive innovations, there may not have been sufficient time for a scientific consensus to emerge (Shwed & Bearman 2010). How the processes and consequences of an innovation are evaluated then depends on perspective and interpretation, and it ultimately becomes a question of power (Stirling 2014, pp.5–6). The way harms and benefits are redistributed among different societal groups will lead some to contest the change and others to support it. The *act* of calling the innovation into question is important in itself. There could exist innovations that are neither permissible nor justifiable, but if this is not realized by persons, perceived as such and acted upon, the innovation will remain uncontroversial. Innovators or regulators can also withhold information or frame innovations in a certain way to influence perceptions of permissibility and justifiability. This influences the type of expertise that is brought to

bear on the issue and the resulting estimations that policymakers work from (Whatmore 2009). The consequences of such framing can be dramatic, as has been demonstrated in how researchers grossly underestimated the fire damage from atomic bombs, even while making accurate predictions of the nuclear blast, leading to overproduction (Eden 2004).

Controversy and political salience is intersubjectively constructed, but they follow from some underlying material conditions that the innovation causes, namely the realized or actual potential of the innovation to redistribute benefit and harm, as well as the way this happens. According to Adler (1997, p.322): "the manner in which the material world shapes and is shaped by human action and interaction depends on dynamic normative and epistemic interpretations of the material world." Being novel phenomena by definition, any disruptive innovation will initially be open to interpretation by societal groups, who, viewing it from their respective positions, are likely to arrive at contrasting answers to the following questions: what *is* the innovation, what does it *do*, and what does it *mean*? Any purely instrumental-rational calculation or estimation of an innovation's utility to a society will never address the question of what that innovation means. The answers to these questions require normative judgments and discursive battles.

Disruptive innovations that are controversial therefore lead to especially heated political debates and calls for regulation. Uncontroversial ones either proceed without regulatory attention or the bare minimum to ensure the functioning of the market. In any case, regulatory matters will not become the targets of public debate and scrutiny if they are deemed uncontroversial. E-cigarettes are controversial and provoke argument. They permit a redistribution of benefit and harm that has been called into question (West &

Brown 2014): for instance, there is a potential to improve public health by reducing harm from smoking, but it could be contingent on supporting the tobacco industry by creating new revenue lines and renormalizing smoking. Therefore, in answering the question, "ought we to restrict or ban the sale of e-cigarettes?" there will be strong disagreement. Computer disk drives, on the other hand, have not resulted in a redistribution of harm or benefit that has been called into question. Most agree on the benefits of better disk drives, and the material conditions of the change are not conducive to drumming up a controversy. They resulted in huge upsets within the disk drive industry, but not anything that was publicly contentious (Bower & Christensen 1995). Therefore, there has been little need for political involvement in this sector. This conception of controversy leaves room for both material conditions and human agency. Opponents of a specific disruptive innovation can seek to restrict it by drumming up controversy and getting political involvement, but this is difficult if the material conditions of the innovation are not easily given to interpretations that make it seem unjustifiable or impermissible. Once an innovation comes to be seen as controversial however, it will be very difficult to defuse the situation, because any attempt at doing so will be viewed as politically motivated and hence controversial in itself.

Political involvement in disrupted market sectors does not only occur when the public or experts ask for it. The demand for regulatory involvement in markets often originates from industry itself, for example in search of standards or regulation that cements the position of incumbents and locks out new market entrants (Ponte et al. 2011; Abbott & Snidal 2009b). Following a disruptive innovation, it might happen that the incumbent innovator seeks to put certain standards into law that give the firm in question a competitive advantage in supplying the innovation. Regulators may comply

if there is a lack of sector-specific expertise needed to realize the competition-distorting effects of such a move. If the public or certain experts (either within or outside the regulatory agencies) do not call the move into question, it remains uncontroversial, and the mistake may not be felt or realized for a long time. Life goes on. If the move *is* called into question, thereby making the regulatory move controversial, it becomes an area of contentious politics that fits the area of the current investigation. "Controversy is at the heart of politics" (Bueger 2011, p.171) – it is a key factor not only in defining why disruptive innovations are objects of political interest, but also in delimiting the present study's pool of applicable cases.

To provide an idea of the case population of the study, Table 2-1 below gives examples of disruptive innovations, the corresponding markets they disrupt, and a typology dividing them into controversial versus uncontroversial examples. What the table makes clear is that disruptive innovation is a phenomenon that is both at the heart of societal development and at the fringes, spanning everything from environmental issues (Willow & Wylie 2014; Cotton 2015) to security issues (Dombrowski et al. 2002; Dombrowski & Gholz 2009). Examples such as the move from hunter-gatherer society to agriculture and sailing ships to steam boats speak to the historical generality of the term, while items such as drones and artificial intelligence are at the absolute frontier, where we still do not know how society will be impacted in the longer run. Controversial examples are not restricted to more recent times though – there are older examples of controversial disruptions such as machine guns and submarines that led to public outcries, changes to regulation and changes to warfare. The case studies I have chosen are topical examples occurring in mature, heavily regulated industries that have led to a new state of uncertainty and renewed regulatory attention. Both have also been

recent targets of EU regulation. The table provides a sampling rather than an exhaustive list, as that would be unfeasible, but it demonstrates the ubiquity of disruption and the importance of focusing more analytical attention on the phenomenon.

Table 2-1. A typology of disruptive innovations.

	Disruption	**Disrupted market**
Controversial	1. Hydraulic fracturing 2. Electronic cigarettes 3. Digital piracy 4. Machine guns 5. Submarines 6. Massively Open Online Courses (MOOCs) 7. Uber 8. Wikipedia 9. Unmanned autonomous vehicles (drones) 10. Artificial intelligence	1. Oil and gas exploration 2. Tobacco and pharmaceutical nicotine-replacement therapies (NRT) 3. Physical media (video, music, software) 4. Rifles 5. 19th-century navies 6. Higher education 7. Taxis 8. Traditional encyclopedias *9. Not currently known* *10. Not currently known*
Uncontroversial	1. Miniaturization of disk drives 2. Light-emitting diodes (LEDs) 3. Hydraulic excavators 4. Digital photography 5. Steam boats 6. Agriculture	1. Computer storage 2. Light bulbs 3. Cable-operated excavators 4. Chemical photography 5. Sailing ships 6. Hunter-gatherers

2.3.2 How disruptive innovations challenge regulators

In the wake of disruption, regulators can be challenged for a number of reasons, but two characteristics which many disruptive innovations share cause regulators to be caught unawares: novelty and speed. Novelty means that the innovation is a product or service that does not fall neatly into any preconceived regulatory category or framework. It will be something new or something modified that slips between the cracks of existing rules, for example, new designer drugs that are meant to replicate the pharmacological effects

of existing drugs while avoiding an illegal classification and detection in drug tests (Wohlfarth & Weinmann 2010). Novelty also requires that regulators are not actively monitoring the genesis of the innovation, or that their approval is necessary for it to be brought to market. Consider a new disruptive drug that is developed and brought to market by the pharmaceutical industry. In this instance, the industry will have to go through existing institutional mechanisms to gain regulatory approval to put the drug on the market. Regulators will be warned of the impending need to adjust or produce new regulation. The difference to designer drugs is that designer drugs are meant for the black market, and bypass existing institutional mechanisms, forcing regulators to play catch-up.

Once the game of catch-up begins, the second key characteristic of speed begins to play an important role. It implies that the innovation creates a market that evolves rapidly, both in terms of reaching a large customer base quickly and in terms of changes in the characteristics of the market (e.g., rapid changes in the number and size of firms or variations in product/service design). As an example of such a fast-growing market, consider the explosive growth in the number of Facebook users: from 2008 onwards, they have been adding about half a million users every day (Madrigal 2012). The crucial regulatory consequence of fast-moving innovations is that regulators may suddenly find themselves facing market conditions that were completely unexpected. Markets may start to saturate with the take-up of the innovation, meaning that an outright ban on the innovation becomes increasingly infeasible. It is always easier to ban something before it enters a market – once it is there, it is very hard to take it away. In addition, speed may imply fast-changing product characteristics and continued evolution, making any

proposed regulation rapidly outdated. When innovations are both novel and fast-moving, it has the effect of severely challenging regulatory capacity.

Two more characteristics make disruptive innovations difficult targets of regulation once they have entered a market: complexity and controversy. The controversial aspect of many disruptive innovations was discussed previously. The regulatory implications of controversy are added public and political scrutiny, making any regulatory moves the subject of added attention and sensitivity (Whatmore 2009, p.588), as well as the lack of a scientific consensus, making it difficult to rely on science as a route to closure (Shwed & Bearman 2010). By complexity I mean to signify two things: the first of these is the highly technical nature of disruptive innovations, as they are often made possible by utilizing new technologies, whose functioning and impact require specialized knowledge to address (Lidskog et al. 2011). This forces regulators to draw on external networks of specialists and professionals with knowledge of the relevant technologies or industries to gain access to the required technical insights (Tushman 1977; Haas 1989; Levi-Faur 2005). Second, disruptive innovations are complex in terms of the high degree of uncertainty as to their usage and risks, especially considering that their externalities might affect unexpected sectors of society (Renn et al. 2011; Beck 1992). This means that regulation is at high risk of being ineffective, inadequate, or simply poorly targeted. Table 2-2 below displays the characteristics of disruptive innovations and their regulatory implications.

Table 2-2. The characteristics of disruptive innovation

Characteristics of disruptive innovation	**Market implications**	**Regulatory implications**
Novelty	Introduces new competitive dynamics – new product categories, market entrants, cost and price points	Innovation does not fit existing categories or rules neatly No immediate regulatory expertise on hand to face challenge
Speed	Incumbents often caught by surprise Rapid growth in customer base Rapid development of innovation	Market changes faster than regulators can keep up Bans are difficult due to consolidated user base
Complexity	Increases uncertainty Technologically complicated	Challenges forecasts and assessments Requires sector-specific and technological expertise
Controversy	Challenges the social license to operate	Increases public and political scrutiny and sensitivity Lack of a scientific consensus to draw on

E-cigarettes are a prime example of an innovation that moved before regulators. Their novelty lies in being a cigarette that does not contain tobacco while being marketed as a healthier alternative. Thus, they do not clearly fit either pharmaceutical or tobacco product regulatory frameworks, as they are previously unseen products that lie somewhere in between (World Health Organization 2010). In terms of obscurity, they were invented in China, and most are still manufactured there (Grana et al. 2014). Their sales initially occurred mostly through internet retailers that sell across national boundaries (Yamin et al. 2010). Regarding speed, internet retail undoubtedly explains part of the rapid uptake and market penetration of e-cigarettes. The growing market for

e-cigarettes has attracted a large number of competitors and competing product designs. Some now speak of an "e-vapor market" rather than the market for e-cigarettes due to the growing number of new designs that do not resemble cigarettes, such as tank-style systems with replaceable cartridges (Gara 2014a). Philip Morris, brand owner of Marlboro, recently entered the e-vapor market with a design that heats up actual tobacco leaves instead of a liquid solution to produce a vapor that is more similar to real smoking (Gara 2014b). The market is therefore clearly evolving still and will probably do so for a long time to come. Rapid changes are likely in the near future as the big tobacco companies put the weight of their marketing and distribution channels behind their new offerings. As will be described in the coming chapters, the novelty and speed of the e-cigarette market caused regulators in the EU to be caught off-guard, unable to apply existing categories of rules and expertise to a poorly understood product.

The regulatory issues surrounding hydraulic fracturing share many characteristics with electronic cigarettes. The complexity and controversy of the issue has strongly polarized the debate into "worries regarding the alleged magnitude of the environmental impact" on the one hand, and very high "expectations about production of indigenous hydrocarbons" on the other (Gandossi 2013, p.3). The scale, frequency and intensity of the fracturing process differs markedly from earlier experiences with well stimulation techniques in the EU, meaning that policymakers were initially confronted with a highly technical and not well understood issue.[10] Although the spread of the technique and the growth in the number of wells and production in the U.S. was very rapid, EU exploration has occurred at a slower pace for a number of reasons (European Commission 2014c, pp.11–7). Yet, there has been rapid development of

[10] Hydraulic fracturing has been used on German conventional wells and tight gas reservoirs since the 1960s (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit 2014).

different technologies for stimulating and completing the wells, and a dramatic increase in the amount of scientific articles investigating different aspects of the process. While there have been existing regulatory frameworks in place that operators have had to go through to get licenses at the national level (European Commission 2014c, pp.34–5), differences persist between member states concerning their interpretation of relevant EU directives and national licensing schemes, leading to regulatory uncertainty (pp.27-32). The level of public acceptance also differs, but it is generally low and has led to outright bans in France and Bulgaria (p.32-4). All of this means that regulators are confronting many of the similar types of dilemmas and uncertainties exhibited in the e-cigarette case. Both are examples of how disruptive innovations that affect highly regulated markets, such as tobacco and natural gas, severely challenge regulatory capacity in different ways. They force regulators to act while giving them incredibly difficult conditions for doing so – these conditions can be thought of as "Collingridge dilemmas".

2.4 The Collingridge dilemma

The Collingridge dilemma, as it has come to be known, is arguably the most powerful statement of the regulatory problems raised by new technologies. First put forward in 1980, it was originally described as a "dilemma of control" (Collingridge 1980, p.11):

> *"The social consequences of a technology cannot be predicted early in the life of the technology. By the time undesirable consequences are discovered, however, the technology is often so much part of the whole economics and social fabric that its control is extremely difficult. This is the dilemma of control. When*

change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult and time consuming."

The dilemma thus describes a double-bind problem facing those who wish to control or steer the direction of technological developments: an information problem (we do not know enough to act) and a power problem (but we need to act now to have any chance of influencing the technology). Within the discipline of Technology Assessment (TA), the dilemma is regarded as one of the most well-established paradigms, and it still orients research even three decades after it was elaborated (Nordmann 2010), especially within studies on the governance of nanotechnology (D'Silva et al. 2012; Shelley-Egan & Davies 2013; Lee & Jose 2008; Guston 2014). It is therefore curious that outside of these areas the dilemma has languished in relative obscurity, even counting the fleeting references to it in works of popular culture (Morozov 2013). Its enduring appeal to specialists is easy to understand: it is a simple idea that provides a compelling explanation of a range of very different and very complex circumstances. That is not to say that Collingridge has been without his critics. From the time of the first reviews of the work (Johnston 1984) to more recent analysis (Schmidt & Liebert 2010; Nordmann 2010), critics have been pointing out the weaknesses of various simplifying assumptions that Collingridge makes. But what the critics overlook, even in spite of the merit of their many claims, is the fact that the intuitive appeal of the dilemma is derived from this apparent simplicity.[11] As a heuristic tool, the dilemma is a powerful way to organize analysis about these issues. It succinctly captures a class of policy problems that other labels or approaches have yet to do as neatly. That the dilemma still provokes argument and debate more than three decades after it was published is testament to the fact that

[11] For a consideration on the role of simplicity versus nuance in theory, see Healy 2015.

the topics raised by this dilemma have evaded all attempts at resolution and possibly become even more pertinent today. Finally, even if we grant that the underlying reality is more complex than the dilemma assumes, the simplicity of its logic and assumptions are still drawn on when policy decisions are reached and legitimized.

Collingridge's (1980, pp.20–21) solution to the dilemma is to eliminate it before it becomes a dilemma, to nip it in the bud by "retaining the ability to change a technology, even when it is fully developed and diffused, so that any unwanted social consequences it may prove to have can be eliminated or ameliorated". Developing better forecasting tools is not a viable option, because even if we had them, we would not know what needed forecasting. In other words, some of the unknowns in the early stages are essentially unknowable because of the various unintended consequences and knock-on effects to be expected by human interaction with the technology. Rather, to prevent the dilemma from occurring, it is necessary to encourage flexible technologies that can be monitored and corrected as they develop and change. This entails not only arranging organizational systems to that effect, but also fostering technologies whose physical properties lend themselves better to adaptation and change (windmills instead of nuclear, for example). In short, the dilemma of control is circumvented by only developing technologies that *can* be controlled (Schmidt & Liebert 2010, p.63).

2.4.1 Studying the Collingridge dilemma in practice

Does the Collingridge dilemma lead us to nothing more than successive iteration, or "muddling through" (Lindblom 1959), as a viable approach? Collingridge himself engaged with Lindblom's "strategy of disjointed incrementalism", seeing his calls for flexibility and corrigibility to provide the underlying logic for Lindblom's formalization of policymaking on complex issues. The science of muddling through tells us that the

ideal-typical conception of the rational-comprehensive approach to policymaking on complex issues is not only theoretically impossible, it is also an empirically untenable description of how decision makers actually approach their work. Rather than attempt a comprehensive analysis of values, means, and ends, decision makers rely on a consideration of these solely at the margin. In other words, they think in terms of concrete, holistic policy options (and not in terms of the constituent parts or underlying assumptions of policies) and only consider the estimated differences in policy outcomes as the meaningful bases for comparison (Lindblom 1959, p.84). In a study on expert advice in the control of environmental lead, Collingridge and his co-author find that disjointed incrementalism as described by Lindblom does most accurately portray the way experts approached this topic (Collingridge & Douglas 1984). Also, Collingridge and Lindblom agreed that our best safeguard on these issues comes from openness, diversity and decentralization – to have as many cooks in the kitchen as is feasible. These calls are strikingly similar to what seems to be a normative consensus within innovation studies as to the imperative of "opening up" and "broadening out" innovation systems and technology assessments in order to secure their democratic control (see for example: Ely et al., 2014; Stilgoe et al., 2013; Stirling, 2008; Van Oudheusden et al., 2015).

These similarities between Lindblom and Collingridge, between policy studies on the one hand and technology assessment and innovation studies on the other hand, hint at a set of shared assumptions about the nature of these problems that goes back many years and suggest the value of developing a closer dialogue. The many criticisms and proposed solutions or ways to work around the dilemma imply that a further consideration of the dilemma as a problem in need of a solution is not likely to yield

novel insights. Instead, I want to ask a question that has not been posed yet, namely: how do actors make sense of the Collingridge dilemma? Or rather, how do actors make sense of the types of policy problems that exhibit the characteristics of Collingridge dilemmas? Furthermore, what are the consequences of such sensemaking? Does it spark valuable practices and arrangements, or does it facilitate uses and abuses of power and knowledge? This is not a question of whether the dilemma is true or not, and neither is it a question of how best to solve the dilemma. It is a question about what the dilemma means and does, what it permits, produces or elicits, as well as a commitment to engage with the political practices that constitute and negotiate the dilemma. Critiques of the Collingridge dilemma leave completely untouched the question of how policy actually does get made on these types of issues – I aim to take the first steps towards rectifying this.

My reasons for asking this precise question are both empirically and theoretically motivated. Empirically, anyone with experience working in the field will agree that the Collingridge dilemma accurately describes how policymakers actually think about the challenges of regulating disruptive innovations. The idea that earlier intervention is more powerful but less informed is uncontroversial. Policymakers have taken this message to heart, as can be seen in the promotion of "Responsible Research and Innovation" as a cross-cutting issue in the latest Horizon 2020 Work Programmes of the European Commission (2015a; 2015b). Public involvement in the earliest stages of science and research can be understood as exactly the type of early engagement that is meant to steer technological development in socially useful directions. Furthermore, the European Strategy and Policy Analysis System's "Global Trends" report also highlights the challenges of disruptive new technologies and how they will test, in

particular, "the flexibility of the labour market and adaptability of individuals" (2015, p.56) – the calls to anticipate and manage change while remaining resilient and flexible are echoes of Collingridge's own policy prescriptions. Clearly, the Collingridge dilemma does not paint an empirically unrealistic picture of how policymakers actually view these challenges. It is therefore a good idea to scrutinize further exactly how they approach the dilemma, which is where "sensemaking" presents a productive path forward. In terms of theory, the concept of sensemaking is a useful organizing focus that allows us to draw explicit links between studies on innovation, organizations and policy through a number of shared underlying ontological and epistemological assumptions. In Chapter 4, I return in detail to sensemaking and delineate the theoretical tools required to attain the goals of the thesis. First, we require a better understanding of the actors and institutions in which these processes play out, which is the topic of the next chapter.

2.5 Conclusion

This chapter started with a simple question: what is meant by disruptive innovation? In answering that question and demonstrating the political salience of it, particularly in the case studies of hydraulic fracturing and electronic cigarettes, large and divergent bodies of literature with long histories and traditions have been drawn in to the discussion. I have sought to overcome this diffuseness by presenting an account in this chapter that is coherent in focusing on how disruptive innovations, as instigators of Collingridge dilemmas, challenge regulatory capacity on four key dimensions: novelty, speed, complexity and controversy. Novelty and speed allow the issues to evade existing regulatory frameworks and grow rapidly to become urgent matters. Complexity and controversy highlight the deficits in expertise and legitimacy, and this leads to struggles

between different groups of external actors to become recognized as the key suppliers to meet the deficit. Regulators engage in this competition alongside the external actors as active participants co-constructing the meaning and institutional frameworks of disruptions.

I have also sought to demonstrate the analytical value in seeing the regulatory challenges of disruptive innovation as examples of Collingridge dilemmas. In doing so, I have argued for a need to move away from the philosophical considerations in which discussions about Collingridge dilemmas have become mired towards an engagement with the political practices that they give rise to. I argued that these practices are best understood discursively by investigating the way actors make sense of Collingridge dilemmas. This implies paying attention to how new technologies are framed and counter-framed, which institutions or expectations are thereby challenged or upheld, and which coalitional arrangements materialize in support of different positions. There are good reasons to think that Collingridge dilemmas produced by disruptions are becoming increasingly ubiquitous in these times (Rosa 2013). That makes it increasingly important that we devote analytical resources to thinking about better ways of approaching them. The purpose of this chapter was to set out on this path. In the following chapter, I look more closely at the settings in which disruptive innovations cause Collingridge dilemmas, focusing on the nature of the actors and institutional arrangements – this leads me to engage with bodies of literature on innovation studies, transnational regulation, and the European Union and situate my argument within these. Thereby, the stage is set for Chapter 4, in which I look more closely at the logics and practices of sensemaking and social interaction during the negotiation of Collingridge dilemmas.

Chapter 3

Innovation politics versus the politics of innovation

3.1 Introduction

The previous chapter argued that disruptive innovations that are novel, fast-moving, complex and controversial force regulators to act while giving them very difficult conditions for doing so. We can think about these conditions as Collingridge dilemmas, where policy actors have to choose between early and forceful (but uninformed) actions or later actions that are better informed but less forceful. These situations impress policy actors into social interactions in which they engage in framing and counter-framing efforts in order to make sense of the disruptions and negotiate their resolution. Where the previous chapter focused on unpacking the research question, this chapter takes a closer look at *where* the politics of disruptive innovation play out and *who* the main actors are. By doing so, this chapter also does the work of positioning the dissertation within the relevant literature.

To organize the investigation, I distinguish between "the politics of innovation" on the one hand and "innovation politics" on the other. By the former, I am referring to the study of innovation within the disciplines of political science – by the latter, I am referring to the study of politics within innovation studies. I begin, in Section 2, with innovation politics. I argue that innovation studies, while showing an appreciation for

the role of politics in innovation processes, is completely overlooking what it means to treat disruptive innovation as a political problem. I label this area of investigation as "innovation governance" and define it as the study of how to manage the political and societal implications of innovation, especially as they play out within individual cases of disruption and re-alignment between markets and bureaucracies. Section 3 goes on to the politics of innovation by discussing the changing role of the state in influencing and regulating economic activity, including innovation. Here, I trace the rise of the regulatory agency as a key institution in contemporary capitalism. Innovation governance is centered on the regulatory agency, and it derives its policymaking power from the recognition of its expertise and legitimacy. On complex policy issues, however, regulatory agencies will frequently have to draw on external networks to gain the necessary knowledge and clout to influence policy issues. All of these things come starkly into focus when we shift to transnational settings, and especially when we consider the EU: a transnational regulator *par excellence*. The overall argument of the chapter is that the study (and practice) of innovation governance requires stronger cooperation between innovation studies and political science.

3.2 Innovation politics: policy as viewed from innovation studies

From its beginnings, innovation has been strongly linked to economic growth in particular (Bernal 1939), but also to national security (Bush 1945). Therefore, the fundamental question for innovation research has always been to explain how innovations occur (Fagerberg 2005, p.9), implicitly making the normative claim that innovations are good and we need more of them. Recently, that goal has been updated

towards gaining "systematic and reliable knowledge about how best to influence innovation and exploit its effects to the full" (Fagerberg et al. 2013, p.1). To provide an overview of the innovation-policy relationship, it is helpful to organize current work in innovation studies into a two-by-two table. On one dimension, we can distinguish between those works that look at how innovation functions at the macro scale (such as innovation systems, networks or clusters) and those who look at the micro scale (such as individuals, firms, or organizations). On the other dimension, we can look at whether the work is oriented towards studying the causes of innovation or studying its effects. Mapping these two dimensions onto a table would yield an overview of the innovation studies literature as seen below with a few key works cited as examples in each quadrant.[12]

[12] The works cited in this table are not meant to provide an extensive and complete overview of the field, and neither are they meant to portray the paragons of the discipline – I cite them in order to provide examples that contribute to understanding the main distinctions drawn in the typology. The fit between the table and the clusters identified by Fagerberg et al. (2012) is also not a perfect one-to-one fit: the Organizing Innovation cluster also deals with works that look at the macro-scale (such as the industry level), but it could be argued that there is an emphasis on providing knowledge that is useful from the perspective of the individual organization. The point I want to make here is that the table is a helpful heuristic for understanding the argument of the chapter and to point out and conceptualize a blind spot in innovation studies.

Table 3-1. An overview of the innovation studies literature[13]

	Macro-scale	**Micro-scale**
Causes	Innovation Systems Freeman (1987) Lundvall (1992) Nelson (1993) Braczyk et al. (1998) Mazzucato (2013)	Organizing Innovation Teece (1986) Cohen & Levinthal (1990) Henderson & Clark (1990) Tidd et al. (1997)
Effects	Economics of R&D Marx (1993) Schumpeter (1943) Nelson & Winter (1982) Freeman & Soete (1997) Porter (1990)	Reacting to innovation Christensen (1997) *Innovation Governance*

Source: Adapted from Fagerberg et al. (2012).

According to Fagerberg, Fosaas, and Sapprasert (2012), the innovation studies literature clusters into three linked but distinct groups: the Economics of R&D (Research and Development), Organizing Innovation, and Innovation Systems. These clusters fit the two-by-two typology, filling out three of the four quadrants. The Organizing Innovation cluster looks at the way individual organizations, firms or industries organize in order to become more innovative, benefit better from innovation, or defend themselves from the pressures of innovation. The scope for policy in the political sense is limited in this cluster as the works here tend to view innovation from the perspective of the individual organization – policy here mostly has to do with managerial or strategic decision-making. The Innovation Systems cluster has its beginnings in the national systems of

[13] The cluster analysis is drawn from Fagerberg et al. (2012). I have made two changes to their groupings: Christensen (1997) has been moved to the "Reacting to Innovation" quadrant and Nelson & Winter (1982) has been moved to the "Economics of R&D" quadrant. The logic of the first move is that while his books investigate both the causes and effects of disruption, their purpose is primarily to inform management decisions. The logic of the second move is that this work is thematically closer related to the other works in the Economics of R&D cluster as the goal of the book is to challenge neoclassical economic theory and its unsatisfactory explanations of how innovation impacts the dynamics of competition among firms.

innovations literature and is broadly concerned with studying institutional setups at the macro level, concerning themselves with the flow of technology and information among people, enterprises and institutions in national or regional settings. Like the Organizing Innovation cluster, the focus is on the causes of innovation in order to produce more innovation and better benefit from it. In this quadrant the emphasis is very much on an active role for policymakers in the construction of innovation systems, but the analyses tend to care more about what policies can do to foster innovation and not the policy problems that innovations may bring about. Finally, the Economics of R&D cluster focuses on the systemic impacts of innovation and how these systems change over time as a consequence thereof. These works are mostly concerned with providing better explanations of economic change as a consequence of innovation. In this quadrant, the literature does question what innovation does, but the replies tend to look at the macro-scale and restrict themselves to economic analysis. Although policymakers and other strategists are cast in roles having to respond to these external pressures and with less scope for initially shaping these themselves, policy is not the main focus of these studies and fades into the background behind economics.

What about the final quadrant: the micro-scale effects of innovation? This is where we would expect to find studies on the political and regulatory challenges that innovations raise, among other things. To the extent that Christensen's studies on disruptive innovation deal with the effects of disruption on individual firms, other organizations or even entire sectors and industries, then he also has a home here. But there is a marked lack of studies that go into the politics of innovation: when it comes to answering the question "what does innovation do?" the replies within innovation studies have tended to look at the macro-scale and focused on economic analysis. There is an

opportunity to devote more attention to the micro-scale, and in particular to the impact of innovation on policymaking, that is, the regulatory challenges raised by some types of innovations. This is the area that Innovation Governance (IG) should concern itself with.

The innovation-policy relationship can be understood cyclically: innovations can impact policy, and policy can impact innovation. Over time, this creates a cycle of iteration and feedback loops between policy systems and innovation systems that account for their continual development. From the previous discussion about Table 3-1, it is clear that the majority of research in innovation studies that deal with both innovation and policy focus on gaining a greater understanding of the actions, mechanisms or institutional setups that are the most conducive to producing innovation. These inquiries are valuable and have proven their policy relevance (Lundvall & Borrás 2005; Mazzucato 2013). However, when it comes to answering the question "what does innovation do to policy?" the replies within innovation studies have been more muted.

Are there studies that take this cyclical relationship more seriously? Within the more economics-leaning branch of the discipline, attention to co-evolutionary processes is growing (Dosi 2013). In a different discipline, Science and Technology Studies (STS) have long been indicating the co-constitutive effects and feedback loops between science and policy (Jasanoff 1987; Latour 1998), but this interaction seems less fully developed when we look at innovation and policy. Even when attention does get directed specifically to *interaction* in the innovation-policy "dance" or in the effects of non-technological regulations, it is always with a view to enabling more innovative activities (Kuhlmann et al. 2010; Paraskevopoulou 2012). If the self-proclaimed theoretical core of innovation studies is "the conceptualization of innovation as an

interactive process" (Lundvall 2013, p.33), then when it comes to the political system, it is fair to say that it has mostly been treated as a case of policies acting on innovations and not the reverse.

That current work in innovation studies emphasizes the promotion of innovation is entirely unsurprising given the history of the field and its links to economic growth. However, when we reverse the causal arrow in the relationship between innovation and policy, we open a Pandora's Box of political and societal *implications* of innovation that deserve more attention. Until that box is opened, we are essentially neglecting one half of the innovation-policy relationship. There is an opportunity here for policy studies and innovation studies to come together in order to flesh out what interaction in the innovation-policy relationship looks like, particularly in the case of innovations acting on policy. This research program can be called "innovation governance", and one of the goals of the dissertation is to take the initial steps towards defining this area.

I am not alone in arguing for more attention to this issue. For example, Martin (2010; 2012) has called for a more sophisticated model of the interaction between policy research and policy-making, and Steinmueller (2013, p.161) has argued for the need for innovation studies to address the "uneasy relationship with public administration as well as politics." This program can also be seen as a development of Mazzucato's (2013) call for reimagining the role of the state in innovation. In spite of the advances made within the Innovation Systems literature, the state is still primarily seen as a fixer of markets – which is especially true when it comes to the European Commission (Mazzucato et al. 2015). But in addition to this much bigger role for the state in directing mission-oriented investments in innovative activities, it should be clear that states and regulatory agencies play a major role in defining and constituting

innovations by writing the rules to which they must adhere. These rules are often reactions to innovative developments that have caught regulators off guard, and they are immensely important for distributing the costs and benefits of innovations among societal groups. For instance, in reviewing the societal impacts of planned obsolescence in consumer goods and financial innovations, Soete (2013) decries how regulators succumbed to short-termism and vested interests that led to "destructive creation" in both cases. In order to secure truly innovative and beneficial "creative destruction," Soete argues for stronger and more independent public agencies staffed with high-quality personnel. Presumably this staff will need to be better at distinguishing between different types of innovative activities and reacting to them appropriately. According to Soete (2013, p.142), "society sorely missed an appropriate innovation assessment tool." It is ironic, then, that the sub-discipline of technology assessment (which has always resided on the fringes of innovation studies and STS and from where we took the notion of Collingridge dilemmas discussed in the previous chapter) is not being suggested as harbouring the seed of such a hypothetical tool.

IG should exceed the ambitions of technology assessment (TA), however. The purpose of TA is to contribute to the formation of public and political opinion on the societal aspects of technologies via a structured, deliberative process. While it is important to pay attention to how opinions are formed, IG should go a step further by studying how policy actors wield these opinions as well as scientific facts to compete for influence and control of the policy processes that regulate disruptions. This cannot be a task left solely to innovation studies – it entails a closer partnership with political science to situate policy actors in their institutional settings.

3.3 The politics of innovation: innovation as viewed from political science

We can begin by asking political science the same question that we asked innovation studies: where do innovations come from? In classical economic theory, the state is traditionally seen as getting in the way of innovation by excessively regulating market activity, which, they argue, it should only do when absolutely necessary to correct market failures (Williamson 1971). The idea of reducing the role of the state in innovation to a passive market-fixer has faced numerous strong challenges from political science. States frequently play a key role in fostering innovation and competitive industries, and they should therefore be understood as centrally placed suppliers of disruptive innovations.

3.3.1 The myth of the powerless state

To begin with, the literature on state capacity, originating in historical sociology, studies how states learn to do certain things over time, thereby building the institutions of the nation state and securing autonomy (Skocpol 1979; Mann 1984; Tilly 1992). This literature made its way into International Relations (IR) and International Political Economy (IPE) over time (Hobden & Hobson 2002), including studies that deal with trade (Hobson 1997; Hobson 1998), finance (Seabrooke 2006), and industrial policy (Evans 1995). The state capacity argument concerning industrial policy can be summarized as "picking the winners", and is especially influenced by studies on the developmental state in East Asia (Wade 1990; Evans 1995), which challenged the idea that their rapid development could be explained by adherence to free market principles. Specifically, East Asian development was often a story of how states and businesses

fostered closer links over time in pursuit of economic goals, which led to industrial success stories (Wade 1990), but also cases of state capture through "embedded autonomy" (Evans 1995). These insights contributed to a stronger appreciation for the competitive advantages conferred by state-embedded institutions for governing the economy in areas outside of East Asia as well (Weiss 1998; Cerny 1997) – a theme that was further developed in the varieties of capitalism literature (Hall & Soskice 2001; Campbell & Pedersen 2007) and ideas about institutional competitiveness (Marcussen & Kaspersen 2007; Borrás & Seabrooke 2015).

In Comparative Political Economy (CPE), there is thus strong appreciation for the different ways states build competitive national economic systems – ways that need not be restricted to market mechanisms. As another example of this, Ornston (2012a; 2012b) studies how the Nordic states restructured when their traditional low- and medium-technology industries, on which their wealth was based, came under pressure due to a changing economic landscape and technological disruption. He argues that a specific Nordic model of neo-corporatism allowed Denmark, Finland and Sweden to leverage a history of state-industry or industry-labor relations to foster creative investments in R&D or skills development, allowing these small states to punch above their weight in high-technology competition. Markets that evolve outside the purview of regulators initially operate in a legal vacuum, or in regulatory grey areas. Newman (2008) has detailed the evolution of limited and comprehensive privacy regimes in the U.S. and EU as responses to the increasing prevalence of electronic personal data in industrial societies. He argues that the development of very high regulatory capacity in the EU let them respond with stricter privacy rules than the self-regulation championed by the U.S. The development of expertise in transgovernmental regulatory networks are

a crucial part of the explanation. In both of these accounts, we see regulators playing a key role in working together with market actors to craft prudent regulatory responses to market changes.

This theme is also addressed in Woll's (2008) study on liberalization in the telecommunications and air transport sectors. Woll counters the common assumption that the material interests of dominant firms dictate trade policy. The problem with this assumption is that it cannot explain variation in interests between firms that face similar material environments. Instead, she argues basic interests are mediated by the way firms self-identify, the causal and normative beliefs they hold, and the strategic environment they face (p.36). Complex trade policy issues go beyond simple considerations of whether to raise or lower tariffs and barriers. Modern trade, especially in services, has more to do with market access than tariff reduction. Negotiations are therefore about aligning regulation and setting standards, which requires high technical expertise and willingness to share information between firms and governments. This engenders closer relationships between firms and regulators over time and introduces new, important elements that shape their interaction. For example, businesses in the EU found that to get the ear of supranational regulators, they at least had to appear to be in support of liberalization measures. This was the only way to enter the policy process. Over time, airlines and telecommunications firms updated their preferences not as a result of new information or changing market conditions, but as a result of *social interaction* with the regulators. What Woll's study demonstrates in detail, and what both Newman and Ornston infer, is that relationships between regulators and firms matter a great deal for explaining and understanding complex regulatory processes. This supports the idea that in these types of cases it makes a lot of sense to focus more closely on the specific

people and events that make up the case, rather than a set of more abstract variables that describe certain aspects of it, but with less scope for narrative (Abbott 1992; Kauppi & Madsen 2014).

What Woll's (2008) study also suggests, crucially, is the growing importance of in-depth and sector-specific expertise that is needed to effectively regulate modern economies. This is a point which Mazzucato (2013, p.4) concurs with when describing the needed skill sets of "entrepreneurial" bureaucracies as requiring not only "bureaucratic skills (though these are critical, as pointed out by Max Weber) but real technology-specific and sector-specific *expertise*". The growing importance of expertise and closer relations with market actors are two sides of the same coin: more frequent and open interaction with market actors is a way to build regulatory capacity, which is defined as the ability of a jurisdiction to "formulate, monitor and enforce a set of market rules" (Bach & Newman 2007, p.831). As markets grow in size and complexity through liberalization and globalization, regulatory capacity has to keep up. Returning to the issue of disruptive innovation, it is clear that a disruption increases complexity in a market by challenging existing expectations and adding uncertainty.

Recent works have documented the powerful role the state has traditionally played even in liberal market economies that tend to provide more scope for market-based competition. For example, Mazzucato (2013) uses the example of the iPhone to argue that state-sponsored research was responsible for the development of all the major technologies that made the product possible. Apple repackaged these technologies into an attractive innovation, but the technologies might not have been developed without the capabilities of the state to guide and invest in basic research. Similarly, Weiss (2014) argues that U.S. technology leadership owes much to the development of a

"national security state" since the end of World War II in pursuit of military and political goals. These studies seriously challenge the mainstream narrative of "timid states" and a risk-taking, entrepreneurial private sector.

3.3.2 The myth of the powerless bureaucracy

If states are thus key actors in contributing to market innovation and regulating economic activity, do they themselves change as a consequence of their changing environment and relations? The literature on the "regulatory state" provides an affirmative answer. The idea of the regulatory state arose out of the challenges faced by the traditional welfare state following the economic downturn after the Oil Crisis of 1973 and the rise of neoliberal economic ideas in academic and policymaking circles. Seidman & Gilmour (1986) relied on the concept to make sense of the policies of the Reagan administration. The literature on the regulatory state suggests that it is incorrect to argue that neoliberal economic policies led to a dismantling of the state – rather, it has led to a situation of "freer markets, more rules" (Vogel 1996). As countries liberalized different economic sectors, they were forced to create more rules and regulatory agencies to oversee newly created markets that had previously been state monopolies. It is therefore more appropriate to speak of a general trend of "re-regulation" rather than deregulation.

A crucial point about re-regulation and the regulatory state is that it seems partly born out of a necessity to *control* the functioning of newly created markets. Consequently, the regulatory state implies a shift in the primary functions of the state away from income redistribution and macroeconomic stabilization towards more market regulation (Majone 1997, pp.140–1). The regulatory state is a state "that applies and

extends [and claims a legitimate monopoly on] rule making, rule monitoring, and rule enforcement either directly or indirectly" (Levi-Faur 2013, p.39). While adapting to changing socio-economic conditions, states still played a key role in creating and controlling a number of new market sectors by expanding their regulatory capacity. States and markets are not involved in a zero-sum relationship (Vogel 1996, p.3) – rather, the policies of states are required for the creation, expansion, and functioning of market society.

So the rise of the regulatory state should not be read as a confirmation that states and their attendant bureaucracies are powerless in the face of changing market dynamics. The re-regulation versus deregulation argument provides some evidence to this effect: it is important to note that deregulation does not happen in a uniform way, uncritically implemented by an automaton bureaucracy. Vogel (1996) demonstrates this in highlighting variation in the degree and form of deregulation of similar sectors in different national contexts, depending on the orientation and organization of bureaucratic regimes. In addition to Vogel's arguments, there has been considerable amounts of work in policy studies to defeat the idea of market-adjusting bureaucracies. For instance, similar to the myth of the powerless state dispelled by Weiss (1998), Hood (1991; 1995) dispels the myth of the powerless bureaucracy. The emergence of New Public Management (NPM) since the 1980s is often understood as a story of bureaucratic restructuring by necessity to better face the changing social conditions of the post-WWII era (Hood 1991, p.7). However, Hood demonstrates that the emergence of NPM did not give rise to a uniform, all-purpose bureaucratic culture (even though it was presented as such) across different national contexts (Hood 1995). In some contexts, NPM was seen as a way to ward off "privatization and bureaucide", while in

others, it was seen as the first steps in realizing such an agenda (p.107). As much as it had to do with changing external conditions, NPM was equally about changing the internal values by which public administration was organized. The lesson to draw from Hood is that we cannot assume regulatory responses to disruptive innovations to follow automatically and coherently across different contexts to changes in some set of external conditions. The bureaucracy should be unpacked to better bring to light its own internal struggles, varying interests, and rich institutional life.

The above discussion points to two different relationships between innovation and the state. On the one hand, states (or regulatory agencies) can support innovation in various ways as suggested by the literatures on the developmental state, systems of innovation, and so on, covered in the above. On the other hand, states (or regulatory agencies) are themselves changing as a consequence of these actions coupled with pressures from globalization and liberalization, but in ways that allow them degrees of freedom in influencing the direction of change. How do we reconcile these opposing movements? A single causal pathway from one to the other cannot suffice. It seems more accurate to assume a multi-directional or cyclical causal pathway between the two relationships between innovation and states. In that sense, we can assume that the relationship may be described as a form of Polanyian (1944) double movement. Polanyi describes how the construction of capitalist institutions leads to social dislocation, which then becomes redressed through social protectionism. States and markets are thus continually making and remaking each other in a cycle of "dis-embedding" and "re-embedding" of the market in society. Similarly, when states reorganize institutions in support of innovation, those innovations have the potential to change the way the market operates and hence the way the state relates to that market. New rules and

regulations may be called for to redress concerns or externalities brought about by the innovations. This leads to changes in bureaucratic structure such as the creation of new specialized regulatory agencies. In turn, new regulatory and bureaucratic setups can have implications for the potential and scope for new innovation. Innovation and regulation can be thought of as individual, smaller-scale changes in the larger institutional arrangements of the state and the market – a micro-scale reflection of the macro-scale co-constitution of states and markets. In this manner, disruptive innovations speak to the heart of political economy.

3.3.3 Experts, expertise and legitimacy in regulation

One of the claims of the regulatory state literature is that an increasing amount of rulemaking, monitoring and enforcement in advanced industrial societies is becoming the prerogative of decentralized and specialized regulatory agencies – if we want to understand innovation governance, we have to engage with the regulatory agency. The rise of the regulatory state was thus reflected in changes to the organization of bureaucracies, or those who are responsible for doing the work of regulating the market economy. Regulation is defined as "sustained and focused control exercised by a public agency over activities that are socially valued" (Selznick 1985). Sustained and focused control over economic sectors require expert knowledge of the sector as well as intimate involvement with its activities through ties to market actors. This is especially true of sectors that experience increases in technological complexity or rate of change following disruptive innovations. Increases in market complexity should confer a comparative advantage on specialized regulatory agencies in the practice of regulation

as opposed to the more generalist traditional, Weberian bureaucracy (Majone 1994; Majone 1997).

The increasing importance of the regulatory agency led analysts to begin shifting their focus from centralized government to decentralized governance (Braithwaite 2000). New forms of private authority and rule-making challenged the assumption that the state was necessarily the central or most important site of regulation (Braithwaite & Drahos 2000). In the "age of governance", the capacities and resources needed to govern have become dispersed (Scott 2004). However, this does not strip the state of its role – it merely redefines it. Levi-Faur (2005) suggests that the state is an important actor in supporting and legitimizing "regulatory capitalism". Capitalism today is highly dependent on regulatory agencies to create, sustain and protect markets, and the explosion in the number and diffusion of regulatory agencies has been documented by Jordana, Levi-Faur and Fernández-i-Marín (2011). As a primary driver of the diffusion of regulatory agencies, they highlight "the increasing importance of social networks of professionals, regulocrats, and epistemic communities that are active in international organizations or also share similar cultural identities, alongside the increasing embeddedness of the national in the global and the global in the national" (Jordana et al. 2011, p.1362). They conclude that regulatory agencies diffuse through sectoral, transnational channels in advanced industrial societies rather than through national channels.

The above conclusion sits well with the body of literature that is bringing together the strands of transnational governance and transnational regulation, such as Mattli and Woods (2009), Abbott and Snidal (2009b; 2009a), Djelic and Quack (2010), Djelic and Sahlin-Andersson (2006), and Overdevest and Zeitlin (2012). These studies in various

ways touch on the important role of actors who are external to the regulatory agencies, such as multinationals, law firms, and NGOs, in setting and developing regulatory standards and disseminating them across the globe. What drives the growing importance of these new actors is the increasing need to regulate cross-border economic relations due to globalization and the connected trends of liberalization and re-regulation (Quack 2010, p.3; Vogel 1996). The traditional bureaucratic structures of states are challenged when markets outgrow the regulatory domains and capacities of national institutions, leading to a governance gap. New actors who come together in different transnational governance arrangements are filling this gap.

The governance gap is created by a shortfall in regulatory *expertise* and *legitimacy* (Quack 2010). These two concepts are of central importance to the present investigation and bear discussion in further detail. Legitimacy has to do with the "rightfulness and acceptability of political authority" (p.6). Three alternative standards have emerged for assessing the legitimacy of transnational governance arrangements: inclusiveness of participation, expertise-based effectiveness, and procedural fairness (p.7). These correspond to input, output and throughput legitimacy (Scharpf 1999; Risse & Kleine 2007). When markets outgrow regulatory capacity, legitimacy suffers. For example, the national bureaucracy of a state cannot legitimately interfere in the economic transactions that take place in another state. They will have to establish new transnational governing structures in agreement with other states, which aspire to the normative standards above. In addition to these normative standards of legitimacy, an empirical standard of legitimacy must be added to check for the subjects' perception of the legitimacy of the governing structures. Any bureaucratic structure that lives up to normative standards of legitimacy can still, for various reasons, be perceived as

illegitimate in the eyes of subjects (Weber 1978, p.213). Perception and social construction of legitimacy, based on how arrangements are seen to live up to the normative standards, plays a crucial role in determining social action towards these arrangements. This is similar to how disruptive innovations have to possess the potential to effect real changes in markets, but will ultimately only come to be seen and acted upon as disruptive if they happen to be socially constructed as such.

Expertise is a key component of output-based legitimacy. For regulation in complex settings to be effective, it must draw on expert knowledge to be correctly targeted and for its mechanisms to function. In areas characterized by a high degree of specialist knowledge, such as financial regulation, expertise is paramount. However, expertise should not be theorized as something entirely subservient to legitimacy needs. The idea of output legitimacy assumes that legitimacy is conferred after expertise has been demonstrated, but this relationship might just as easily be reversed: professionals or experts can use legitimacy claims to position themselves as those who should rightfully be addressing a certain issue, and only then start to apply their expertise. The relationship goes both ways.

Expertise can therefore be an end in itself, which the literature on the sociology of professions has argued for long (Abbott 1988; Abbott 2005; Freidson 2001). Some actors compete in governance arrangements to be seen as the experts on the issue, not only to supply the regulators with output legitimacy, but because the recognition of their expertise can lead to other rewards in the societal domains they inhabit (Seabrooke 2014). For example, medical experts, demographers, and economists all compete to be seen as the experts to consult when tackling the problem of low fertility facing many advanced, industrial societies (Seabrooke & Tsingou 2015). They frame the problems

differently through “issue distinctions” that favor their respective bodies of professional expertise. Similarly, differentiation has been observed in expert groups on financial reform between those who favor structuralist and those who favor behavioral responses (Seabrooke & Tsingou 2014). These distinctions have more to do with how various expert groups are motivated to occupy different areas of social space as a competitive strategy to control current and future work, and less to do with converging around an objective supply of output-based legitimacy for the regulators to draw on. From this it follows that regulators cannot draw uncritically on external sources of expertise – the decision about who to listen to and who to ignore is a political choice with ramifications in the societal domains the experts occupy and influencing the perceived legitimacy of regulatory actions.

The needs for expertise and legitimacy are key drivers of the transnationalization of governance. New transnational governance arrangements must tap into a diverse pool of stakeholders in order to live up to input, output and throughput legitimacy requirements (see for example Tsingou 2015). Tapping into the expertise needed to comprehend markets that increase in complexity is paramount for effectively targeting regulatory mechanisms. The supply of expertise and legitimacy increasingly exists outside the regulatory agency in advanced, industrial societies. Furthermore, as suggested by the sociology of professions, there are no stable bases of expertise and legitimacy for different issue areas. The bases are highly contested areas that different expert groups vie to occupy for the social rewards that accrue from occupying these locations.

This also causes us to relax the definition of who constitutes an expert. While we might traditionally point to epistemic communities (Haas 1989; Haas 1992) of like-

minded academic or professional experts, the concept assumes too much coherence and leaves too little room for competition among different expert groups. Expertise within this perspective is understood as a resource that certain groups possess, that they can wield for influence. In contrast, the sociology of expertise suggests that expertise exists in networks of relations between different agents who interact in competitions in order to be seen as "knowing well" (Lazega 1992, p.30; Eyal 2013). The relational view argues that you cannot possess expertise – it can only be bestowed upon you by others: "knowledge is not a stock of information, knowing or not knowing, but a relationship among professionals" (Seabrooke 2014, p.52). A relational view of legitimacy would make the exact same claim: that legitimacy it not a quality that is possessed, but a quality that is bestowed through patterns of interaction. In studying the ways regulators respond to the challenges of disruptive innovation, it is crucial to leave the analysis sensitive to the micro-scale interactions between policy actors as they compete to be recognized as the central suppliers of legitimacy and expertise.

Expertise and legitimacy are related in interesting ways to two of the problem characteristics of disruptive innovations: complexity and controversy. The complexity of disruptive innovations increases the need for expertise. Often, specialist knowledge is required to properly craft regulation that takes into account the highly technological and scientifically complicated aspects of a disruptive innovation. Assessing the risks of fracking requires in-depth knowledge of geology, geophysics, petroleum engineering, and hydrology, for example. Likewise, addressing e-cigarette regulation requires the insights of public health experts, medical professionals, toxicologists, and tobacco control experts, for example. Paradoxically, complexity also devalues expertise. The high degree of uncertainty makes it less clear whose turf the regulatory matters should

be settled on, and makes it easier for competing professionals to challenge the claims to expertise of others. When expertise is both more valuable and less certain, we can expect intense relational battles to break out between competing groups to become recognized as the experts.

The controversial aspects of disruptive innovations similarly increase the importance of securing legitimacy. Public concerns over the potential dangers of e-cigarettes or fracking increases their scrutiny of regulatory decisions and the importance of those decisions to be perceived as legitimate. Regulators will have to draw on a diverse set of stakeholders and ensure effective outcomes and fair procedures for their decisions to survive legitimacy checks. However, again paradoxically, controversy also devalues legitimacy claims. The controversial nature of disruptive innovations means that there are contending ideas about which norms should apply when assessing the content of regulation. In other words, there are contending normative claims which no amount of expertise will be able to settle. If it could be incontrovertibly demonstrated that the environmental impacts of fracking are minimal, it would not change the views of those who oppose hydrocarbon exploration on principle.[14] Similarly, even if e-cigarettes are definitely much less harmful than conventional cigarettes, it does not allay the fears of those who think they may renormalize smoking and set back years of tobacco control policies (Fairchild et al. 2014).

Innovation governance is surprising in making both expertise and legitimacy more important, but also easier to contest due to complexity and controversy. It is this uneasy relationship between expertise and complexity, legitimacy and controversy that supplies the motion and dynamism to the policy debates. The characteristics of novelty and

[14] See for example The Guardian's "Keep it in the ground" campaign (Rusbridger 2015).

speed mainly impact this relationship by introducing urgency into the equation, and forcing regulators to act quickly. Complexity and controversy, novelty and speed, plague a number of policy issues, not only disruptive innovations; but what sets disruptive innovations apart is the degree to which the problems of expertise and legitimacy are exacerbated and brought into focus. These problems are even more apparent in transnational settings and especially on the level of the European Union.

3.3.4 Transnational settings and the European Union

The present investigation takes place on the transnational level: the regulation of electronic cigarettes and hydraulic fracturing are both being addressed by the European Union. There are a number of reasons for why it makes sense to situate the analysis on this level, and why the EU in particular is an appealing case study. The case studies are themselves transnational phenomena. Electronic cigarettes are sold over internet sales channels (Yamin et al. 2010), and there are worries that the impacts of hydraulic fracturing too easily spread across national boundaries by polluting air, waterways, or aquifers (European Commission 2014c, pp.20–7). These transnational dimensions increase the pressure for harmonizing rules across the European Single Market, tasking the EU institutions in Brussels with drafting these rules and concentrating lobbying power there.

The EU is also of central importance when considering the growth of the regulatory state in the European setting. Majone (1997, pp.144–5) points out two aspects of the Europeanisation of public policy which has hastened the development of the regulatory state: the central position of regulation in EU policymaking, and the impact of EU policies on regulatory developments in member states. Regarding the first

point, it is interesting to note the exponential growth in the number of Directives and Regulations introduced into member state law by the European Union during the growth phase of the Single Market in the 1990s. Today, that pace has settled somewhat as the Single Market matures, but the EU has in general led to a qualitative and quantitative increase in regulation and regulatory work throughout Europe. Regarding the second point, as EU policies become harmonized across the member states, the regulatory apparatus and bureaucracy of the member states begins to change and professionalize in order to live up to EU policies that are often more innovative than domestic ones (Majone 1997, p.145). In short, member states of the European Union have been forced to develop regulatory capacity at an unprecedented rate, driven by the European Commission's propensity for creating new rules. Lacking the traditional powers of a state to tax and spend, drafting new regulation is the only way for the Commission to increase its influence in European affairs (Majone 1997, p.150). This also means that the political contests shift from "the traditional arena of the budgetary process to a new arena where jurisdiction over the review and control of the regulatory process provides the main source of conflict" (p.151). Not only does the arena change, so does the composition of actors. First of all, the judiciary has become an important arbitrator in cases of disagreement over the regulatory process and outcomes (p.155-9). Second, the EU is significant in providing an especially enticing political opportunity structure to organized interests, with multiple layers of government and the complex institutional setup providing multiple access points to policy processes (Richardson 2000). This provides greater scope for professional, expert and public competition to influence policy work.

The Europeanisation of public policy has led some to speak of the European Union as a "regional state" (Schmidt 2006, p.9). The European regional state is characterized by ever-increasing regional integration occurring simultaneously with ever-continuing national differentiation. The causes of this lie in the centralization in Brussels of "policy without politics", leaving the member states to conduct "politics without policy". This is the result of increasing number of competences falling to Brussels without addressing the perceived democratic deficit of the EU (Schmidt 2012). At the EU-level, regulators are not tasked with justifying their actions towards an EU public in the same way that member state governments have to do. They can focus on coordinating actions and insights from different experts and regulators and not communicating decisions to the public – in other words, coordinative discourse is more important than communicative discourse (Schmidt 2006; Schmidt 2008), making the EU an ideal site to study inter-expert competition in regulatory debates. This is supported by Woll's (2012) and Mahoney's (2008) transatlantic comparisons of "lobbying styles". Institutional differences between the U.S. and the EU condition the nature of advocacy work, such that Americans often focus on "killing the bill" through financial and legal tactics, while Europeans focus on sharing information and forming consensus. This also creates an environment in Brussels that is more conducive of social interaction between policy actors based on the negotiation of the normative and cognitive dimensions of policy issues.

The democratic deficit of the EU has not given free reign to technocrats and experts, however. One reason for this is the prevalence of bureaucratic politics (Allison 1971; Peters 1992). Rather than convergence and coherence around efficiency-increasing measures, bureaucratic competition seems to be the norm. The different

institutions of the EU (the Council, Parliament, and Commission) compete to expand their respective powers vis-à-vis the other institutions. Within each institution, there is also competition between different departments who view policy issues differently – the competition between the different Directorate Generals of the Commission being the foremost example of this (Radaelli 1999b, p.761). In addition to bureaucratic politics, the politics of expertise are being counteracted by a logic of politicization. In cases where both salience and uncertainty of political issues are high, experts increase in importance but have to participate in political coalitions to make their views heard (p.762-3). Therefore, knowledge has less to do with individual actors than with the structures in which they act (p.769).[15] This explains why the increasing importance of expertise in the EU is not leading to technocratic outcomes, due to the intense politicization of controversial issue areas. These issues should be seen as adding to the scope for competition and arbitrage that already exists when the institutions draw upon external sources of expertise and legitimacy.

In transnational settings more generally, we can expect professional and expert jurisdictions to be less settled than in domestic domains (Seabrooke 2014, pp.50–1). Transnational settings exhibit "structural holes" (Burt 1992), missing nodes in networks of expertise and legitimacy in different issue areas, and are thus "thin" compared to "thick" domestic environments. In domestic environments, the respective roles and jurisdictions of various professional and expert groups are more consolidated due to longer histories and less competition. At the transnational level, this leaves more scope for professional competition to fill the structural holes in networks of expertise and legitimacy to influence regulatory outcomes and to gain prestige.

[15] See also the relational view of expertise above and as set out by Lazega 1992, Eyal 2013 and Seabrooke 2014.

Finally, technical expertise in the European Commission exists in "issue networks" (Majone 1994, p.90), comprised of not only Commission officials and policy officers in different Directorate-Generals, but also including "experts from national administrations, … independent experts (also from non-EU countries), academics, public-interest advocates like environmentalists and leaders of consumer movements, representatives of economic or professional organizations and of regional bodies". Commission officials draw on expertise in these networks through advisory committees, expert groups, stakeholder consultations, and informal meetings. Their daily work on drafting or revising new regulation consists of drawing in and balancing these various inputs to the policy process. This means that it makes more sense to conceptualize them as "policy entrepreneurs" (Kingdon 1984, pp.21, 104), rather than technical experts working alongside other technical experts. Successful policy entrepreneurs possess three characteristics: a claim to be taken seriously (for example by virtue of authoritative position, recognition as expert, or as leader of an interest group), political connections and negotiation skills, and persistence (pp.189-90). Majone (1994, p.91) argues that "because of the way they are recruited, the structure of their career incentives, and the crucial role of the Commission in policy initiation, Commission officials usually display the qualities of a successful policy entrepreneur to a degree unmatched by national civil servants". Shrewd management of experts and expertise is therefore a key skill and work practice of Commission officials. In crafting policy proposals, they balance their own expertise of the political possibilities and the Commission's own aims and goals (for example, liberalization and harmonization in economic matters[16]) with the knowledge they hold of the sectors in question. Regulators

[16] See Woll 2008.

are not passive agents that unquestioningly implement the outcomes of power struggles between different interest groups. They engage in conversation and negotiation, build relationships, and play off different knowledge pools against each other to further their own aims (Seabrooke 2014).

To summarize the argument of this section: the regulatory state literature recognizes the growing importance of actors external to regulatory agencies and state bureaucracies in supplying the needed expertise and legitimacy to craft effective and just regulation. Drawing upon external actors is an intensely political gesture, however, for a number of reasons. In controversial policy areas, many different actors compete to be recognized as experts on issues to control work and gain prestige. This competition also goes on within the bureaucracies, where bureaucratic politics and the politicization of expertise disallow any "technocratic" solutions to go unopposed. These types of interactions are more apparent in transnational settings than in domestic ones, and exceedingly so in the European Union, where the institutional setup allows expert groups to wield great influence on the supranational level. This attracts much competition to Brussels to provide inputs and build coalitions with other actors to influence the policy process.

3.4 Conclusion

This chapter juxtaposed innovation politics with the politics of innovation. By taking my point of departure in innovation studies, I identified the research area of the dissertation and demonstrated how it was mostly left unaddressed within that discipline. I conceptualized innovation governance as the study of how to manage the political and societal implications of innovation, especially as they play out within individual cases

of disruption and re-alignment between markets and bureaucracies. I then turned to the politics of innovation to provide some insight into the actors and institutions that matter to innovation governance. Here, I echoed the various literatures that have succeeded in positioning the state as an active co-constructor of economic and innovative activity. Special attention was granted to the role of the regulatory agency and the rise of transnational regulation.

In choosing the EU as a setting to study the regulation of electronic cigarettes and hydraulic fracturing, I was motivated by how it embodies the characteristics of a transnational regulator *par excellence*. The European Single Market is the largest and most heavily regulated market in the world, and the EU institutions that oversee it are by necessity complex and filled with rich, bureaucratic detail and life. While it is inescapable that some aspects of the analysis will touch upon the *sui generis* characteristics of the Union, it is hoped that it also serves as an ideal setting to uncover some of the empirical regularities of the transnational regulation of disruptive innovations, and that these insights should be transferable to other settings as well.

Finally, the chapter has demonstrated the importance of experts, professionals and interest groups in influencing the regulatory process through the supply of expertise and legitimacy. It is the assertion of this thesis that to study the processes of interaction and competition that take place between these actors on the regulatory challenges of disruptive innovation, we can learn much by turning to the sociologies of professions, expertise, and disruption. Regulators, professionals and experts are the people who do the actual work of innovation governance, and their social lives are complicated and not easily reducible to brief propositions, assumptions or variables. Therefore, the next chapter considers the ways it might be possible to shift the focal length of the analytical

lenses to the micro level to better understand the processes of social competition in innovation governance, and what benefits to the analysis accrue from such an exercise.

Chapter 4

Framing disruption

4.1 Introduction

Disruptions initiate framing contests, and to understand innovation governance we need to understand how these framing contests unfold. In Chapter 2, I demonstrated the analytical value of considering the regulatory challenges of disruptive innovations as examples of Collingridge dilemmas, where policy actors negotiate problems of uncertainty and power asymmetries in the social control of new technologies. I now continue this line of investigation by considering the roles of sensemaking and framing in the political practices that constitute the dilemma. Periods during disruption are characterized by uncertainty and amorphous social order, where ideas and relations are not as settled as they are after the disruption has passed (Vollmer 2013). Because of that, policy actors need to make sense of the disruption and communicate this sense to others in order to effectively resolve tensions and govern during these turbulent periods. In Chapter 3, we learned that much of this regulatory work of innovation governance is centred on the regulatory agency, but involves a wide variety of interested actors who have different stakes in the innovation. Regulators, meanwhile, are dependent on these external stakeholders to supply the required legitimacy and expertise to craft authoritative and effective policy solutions. I argue that we gain much leverage on the politics of disruption when we view the contests surrounding the supply and demand of expertise and legitimacy discursively, that is, as a framing contest.

In the next section, I return to the notion of Collingridge dilemmas in order to pick up the thread we temporarily left behind in Chapter 2. I suggested that rather than preoccupy ourselves with how to solve the dilemma or whether or not the dilemma is in fact a dilemma, we should ask "what are the consequences of the dilemma": what practices does it permit, produce or elicit? The first step to take on that endeavour is to consider how policy actors make sense of the situations we understand as Collingridge dilemmas. How do they turn those initially problematic situations that confound their expectations into a dilemma in the first place? I argue that the consequence of viewing Collingridge dilemmas as opportunities for sensemaking inescapably leads to actors engaging in framing contests, both over the construction of issues and their resolution. In Section 3, therefore, I consider framing theory and its uses in political science and sociology. I make a distinction between the primarily mechanistic logic of most extant studies (that view framing as a variable) and contrast it with the ecological logic (framing as process) necessary to unpack innovation governance. In pursuit of that task, in Section 4 I hone in on the micro-sociological dimension of framing contests by drawing on Vollmer's (2013) sociology of disruption.

4.2 Making sense of Collingridge dilemmas

Sensemaking is the process of giving meaning to experience – it begins and becomes necessary when the encountered reality defies expectations (Weick et al. 2005, p.409). Sensemaking proceeds through a number of steps. First, events that defy expectations cause an interruption in the flow of experience and activity and demand attention (Weick 1988, p.305). The disruption needs to be explained or made comprehensible in order for cooperation and organization to resume (Vollmer 2013, pp.47–8). In other words, actors need to produce the answers to two questions: "What's the story here?"

and “Now, what should I do?” (Weick et al. 2005, p.410). In order to produce these answers, the disruptive events are bracketed out for closer inspection, then labelled and categorized. Labels and categories make the disruption comprehensible and actionable in terms drawn from actors’ preconceptions or institutional/organizational environments. These labels and categories are organized into narratives that explain the disruption and tell actors what to do.

When making sense of disruptions, it is more important that narratives are plausible rather than accurate. Their foremost task is not to accurately depict reality, but to plausibly account for it by connecting the concrete to the abstract in ways conducive to a resumption of social cooperation. Therefore, communication is a central component of sensemaking. Continual cycles of action and talk unfold over time and iteratively develop a sense of the situation. As people act, they test presumptions and retrospectively learn more about the situation, which leads to new narratives, new actions and so on, implying a form of intraorganizational evolution (Weick et al. 2005, pp.413–4). In organization theory, sensemaking is a departure from the focus on decision-making and strategic rationality towards an appreciation of the complexity and ambiguity of real-world environments (Weick 1979; Weick 1995). In particular, Weick (1995, p.35) argues for a necessary degree of “ontological oscillation”: “If people have multiple identities and deal with multiple realities, why should we expect them to be ontological purists? To do so is to limit their capability for sensemaking. More likely is the possibility that over time people will act like interpretivists, functionalists, radical humanists, and radical structuralists.”

These ontological and epistemological assumptions that underlie the process of sensemaking have radical implications for how to think about Collingridge dilemmas. I

want to highlight two central implications and deal with each in turn: (1) Collingridge dilemmas are not given – they are constructed; (2) Collingridge dilemmas are not solved – they are negotiated.

4.2.1 Collingridge dilemmas are not given – they are constructed

The first implication brings to mind the constructivist critiques of the dilemma outlined in Chapter 2, but where they focused on challenging the dilemma's underlying assumptions and solutions, it is also important to point out that practitioners have to engage in a "certain kind of work" to construct the problem itself: "in real-world practice, problems do not present themselves to the practitioners as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain. In order to convert a problematic situation to a problem, a practitioner must do a certain kind of work. He must make sense of an uncertain situation that initially makes no sense" (Weick 1995, p.9). Problematic situations, disruptive events that interrupt the flow of organizational life, are the building blocks of problems that can become Collingridge dilemmas. This means that it is equally important to pay attention to the "histories of tasks and problems" – in other words, to trace the genesis of events by which a problematic situation becomes disruptive – as to the construction of solutions (Abbott 1988, p.314). This makes disruption an entirely social phenomenon. The ways in which objects, actors, techniques and institutions are yoked together and assembled have a great bearing on who gets to work on them and what counts as expertise in defining and constituting the problem (Cambrosio et al. 1992; Eyal 2013). Because of this, it is important to take note of which actors initially "mark" the disruption by bringing it to the attention of other social participants, and

which assumptions they draw on in doing so (Vollmer 2013, pp.38–43). Any disruption inescapably bears the traces of its social origin.

The "certain kind of work" that turns problematic situations into problems is best approached discursively. When it comes to technological problems specifically, Weick (1990a, p.21) brings attention to what he calls their "equivoque": technologies are not "self-evident artifacts to which people accommodate," but "open-ended artifacts that accommodate to interactions." Technologies can be endowed with multiple meanings that imply multiple directions of development and therefore multiple regulatory options. This is particularly true for new technologies, because they give rise to events which are at once stochastic, continuous and abstract (Weick 1990a). Being stochastic, they represent a moving target for learning because they can change faster than people can accumulate knowledge about them. Being continuous, they knit together and involve an ever-changing collection of people, transactions and locations. Being abstract, knowledge about a new technology places growing cognitive demands on those who are tasked with making sense of them. All of this places a premium on sensemaking, but simultaneously allows multiple plausible accounts to flourish side-by-side, giving rise to the prevalent controversies that are associated with new technologies. This equivoque of disruptive technologies therefore aligns with the characteristics of disruptive innovations that become policy problems, identified earlier: novelty, speed, complexity, and controversy.

The equivoque of new technologies and innovations opens discursive spaces that actors fill with meanings in a way that turns problematic situations into problems they can fruitfully address. This is a well-known theme from organization studies, where this conceptual flexibility of new innovations has been demonstrably connected to

organizational strategy and development (e.g. Leblebici et al., 1991; Munir and Phillips, 2005; Munir, 2005). In political settings, we can supplement this argument with the assertion that disruptive innovations also open "regulatory spaces" by falling in-between the gaps of existing institutional frameworks and making their shortcomings starkly apparent. These spaces are new sites of social interaction where policy actors affected by the disruption come together to negotiate regulatory setups and boundaries (Crouch 1986; Hancher & Moran 1989; MacKenzie & Martínez Lucio 2005). Within regulatory spaces, policy actors lay claim to different "jurisdictions", which in the sociology of professions are understood as social areas under the control of a specific profession. Because of this, some have demonstrated the key role of professional groups in driving endogenous institutional change through dynamics of professional competition (Suddaby & Viale 2011; Muzio et al. 2013). But to restrict this tendency to professionalization projects is to reject its broader implications. Professional and non-professional groups alike engage in discursive struggles to control the meaning of new technologies and innovations in order to direct attention towards some of its aspects rather than others, thereby influencing the position of the innovation vis-à-vis different sets of institutional arrangements. The point to take away from it all is this: the discursive construction of the dilemma has direct implications on which groups, institutions, and regulations are affected and how. It is therefore a good idea to look closely at how sensemaking and institutions are connected, which brings us to the second implication.

4.2.2 Collingridge dilemmas are not solved – they are negotiated

To say that the dilemmas are negotiated is to emphasize that the discursive struggles to control the meaning of new technologies and innovations also initiate struggles over the

social and political control of the institutions that apply to them. The first implication thus has to do with which institutions matter (defining the setting, discussed above); the second implication has to do with how those institutions are then transformed or defended (dictating the action, discussed below).

When it comes to considering how Collingridge dilemmas are negotiated, it is important to state that sensemaking does not remain a cognitive, agent-centred activity (for which it has been criticized) – it connects directly to institutions and the wider social and political setting (Weber & Glynn 2006; Borrás & Seabrooke 2015). Sense is not made in a vacuum, because individuals and organizations are suspended in different webs of values, norms, rules, beliefs and assumptions (Taylor & van Every 2000, p.251; Scott 1995). One way these institutions come to matter is in their capacity to supply context, either as "internalized cognitive constraints" (Barley & Tolbert 1997) or as more productive guides that shape or direct sensemaking processes (Weber & Glynn 2006). This is the mechanism Weick is referring to when he talks about those "preconceptions" that shape action and sensemaking (Weick 1988, p.306). Preconceptions are drawn from the institutional environment. But the relationship also runs counter: sensemaking practices can transform institutions or create new ones by supplying the "feedstock for institutionalization" (Weick 1995, p.35). Institutions are thus both antecedent to and emergent from the processes of sensemaking (Weber & Glynn 2006).

What all of this means is that the negotiation of Collingridge dilemmas is really about the negotiation and transformation of social institutions and how and where to place a new technology or innovation in this "seamless web" (Hughes 1986). The study hones in on the interactive, political processes that do the work of moving innovations

that are already on the market from one area of the web into another. This is the type of work asserts that institutions A, B, and C matter and not X, Y, and Z (defining the setting), while simultaneously it transforms institution C into D (dictating the action).

To give a concrete example to anchor the discussion, there is a definitional battle over whether the ride-sharing app Uber constitutes nothing more than a software platform facilitating contact between drivers and passengers, or whether Uber is in fact acting as an employer (Miller 2016; Gobble 2015). Being defined as one or the other implies that completely different sets of institutional arrangements are invoked to normalize the disruption of Uber, which will have implications for how the sharing economy operates more broadly going forward. The market disruption of Uber, in other words, places regulators in a Collingridge dilemma: they lack information about the consequences of various policy responses, but they have to act now to have any chance of influencing the development of the innovation. Simultaneously, the market entrance of Uber has led to calls in several countries to update taxi and transport regulations that might not have been touched in the several past decades. The variety of approaches that have been pursued on both definitional and transformative issues by different jurisdictions span from total bans to total permission and almost everything in between. In this manner, innovations can be understood as a source of institutional renewal and variation, and in the case of Uber it has sparked a great deal of public discussion and even violent demonstrations, riots or strikes in some cases.

The way to enter this conversation is to first and foremost understand what propels it forwards: framing and counter-framing. Frames are the vehicles on which sensemaking travels between social actors and across social situations separated by time and place (Vollmer 2013, pp.29–33). When someone frames a situation they are telling

others what is going on by signalling which expectations or institutions apply (Goffman 1974). They are actively producing socio-cultural context and communicating it in the form of narrative, stories or "styles" (White 2008, p.xxi, 112-17). Counter-frames are simply narratives that tell a different version of the story in pursuit of other ends. Not only are frames thus essential when it comes to defining the setting of the Collingridge dilemma, but they also dictate the action through the successive iteration of framing strategies. In the next section, I discuss framing theory and its use in politics and sociology.

4.3 Framing theory

Framing is a theoretical concept that has gained broad acceptance across the social sciences. As such, it has been used for a wide variety of purposes due to its explanatory power and ease of application. Examples range from psychology and behavioral economics (Tversky & Kahneman 1981) to securitization in IR (Buzan et al. 1998). However, with broader use comes ambiguity in meaning. Meanwhile, some key questions remain underexplored concerning the resilience of frames in the face of challenges from contending frames and how "framing moves" work in sequence. In this section, I explain in detail what I mean by framing, how framing has been used in similar studies, which aspects of framing I intend to focus on and why.

Studies in framing have previously been accused of "scattered conceptualization" and a lack of a general statement of framing theory (Entman 1993, p.51). However, they are broadly united by emphasizing the power of a communicating text or discourse over human consciousness. The analysis of framing describes how changes in the way a communication is made influences the information that actors

perceive as important. Entman (1993, p.52) offers the following definition: "Framing essentially involves selection and salience. To frame is to *select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation* for the item described" (emphasis in original). Frames therefore diagnose, evaluate and prescribe (Benford & Snow 2000). On complex policy issues such as fracking or e-cigs, the relevance is clear: there are multiple contending ways to define the problem, diagnose the causes of the problem, make moral evaluations of what is at stake, and prescribe solutions. Entman (p. 52) also suggests that frames exist in four locations: in the communicator, the text, the receiver's thinking, and the culture. Communicators make conscious or unconscious decisions about emphasizing different aspects of a text; the frames of a text are evident in the presence or absence of key words, phrases, or stereotypes; these frames guide the receiver's thinking on a topic, which is mobilized within the cultural stock of commonly invoked frames.

Entman's treatment of framing is orientated towards communication studies, which explains the emphasis on texts, communicators, and receivers, but it does accurately describe the common understanding that all social scientific treatments of framing assume. In political science and sociology, frames have received attention for the larger-scale role they play in organizing society. Goffman's *Frame Analysis* (1974) laid the foundations for much of this work. For Goffman, framing is about defining and producing the social context of a certain situation, based on the idea that "sociocultural context is active, not passive; it gets negotiated rather than uncovered or invoked" (White 2008, p.xxi). In any social situation, the subjective experiences of participants

interrelate with organizational principles that transcend single situations. Framing is the process by which participants relate what is going on to more general aspects of order. These aspects of order exist in participants due to training, socialization and individual life trajectory, resulting in "habitus" or "socially informed bodies" (Bourdieu 1977, pp.123–4). Frames are the "schemata of interpretation" that allow individuals "to locate, perceive, identify, and label" actual occasions and make them meaningful in their social lives (Goffman 1974, p.21). For Goffman, the principles of selection and salience in framing identified by Entman still apply, but his theory operates on a larger-scale social level rather than the communicator-text-receiver level of Entman. What is of interest is how successive or multiple instances of framing can add up to produce larger-scale social order. One of the most basic insights about the process of framing is that it is prone to manipulation and exploitation (Goffman 1974, pp.156–200). Framing often becomes a contest to define meaning in order to pursue specific social or political goals. For instance, when climate change is framed as a naturally occurring, inescapable phenomenon, it excuses societal inaction. Or when immigration is framed as a pressure on welfare state finances, it becomes a reason to close the borders. This insight is what has aroused the attention of political scientists in the issue.

4.3.1 Framing in political science and sociology

In political science, the study of framing tends to focus on elites and policymakers and how policy solutions are framed so as to cohere with dominant ideas or public norms (Widmaier et al. 2007). In other words, framing is typically seen as something elites do towards other elites or towards the masses. Within political economy, the idea of passive masses has also been contested particularly by the body of work known as "everyday political economy" (Seabrooke 2006; Seabrooke 2007; Hobson & Seabrooke

2007). These approaches stress the importance of everyday social and economic conventions in providing impulses for institutional change. The media complicates things even further: Hajer (2009) argues that in the "age of mediatization", style begins to matter as much as content, and the media will often put their own spin on events that can influence the traction gained by both elite or mass framings. Goffman would agree with these studies and object to the notion of a passive and unresponsive public. On the first page of *Frame Analysis*, he "denies the very existence of distinctive definitions of situations" (Vollmer 2013, p.33). There is no single way of experiencing and behaving towards actual occasions, which leaves very little room for elites to effectively define what is really going on. Framing is not a proclamation, but a conversation – it is a two-way street (or a multiple-lane ring-road).

In sociology, the literature on framing and social movements has told us much about how this two-way street operates. In the context of social movements, framing "refers to the signifying work or meaning construction engaged in by movement adherents (e.g., leaders, activists, and rank-and-file participants) and other actors (e.g., adversaries, institutional elites, media, social control agents, countermovements) relevant to the interests of movements and the challenges they mount in pursuit of those interests" (Snow 2007, p.1780). Frames perform three core tasks in social movements: diagnostic framing, prognostic framing, and motivational framing (Benford & Snow 2000, p.615). They diagnose problems and attribute blame, they propose solutions or alternative arrangements, and they urge others to act in support of those changes. For scholars working on framing and social movements, such collective action frames are inextricably bound up with "the politics of signification" (Hall 1982). With this literature, we see a graduation in the centrality and agency accorded to the public in

political debates. Campbell (1998), for example, only considers public sentiment as an external constraint on elite framing options, with no word on how that sentiment develops or gets communicated. Seabrooke (2006) talks about the importance of social and economic conventions, but still treats the public in aggregate, mass terms. The literature on framing and social movements tells us about *how* the public matters in detail. Public sentiment or convention is not automatically given or brought to bear on political debates – there are intense social maneuvers and competitions that go into deciding which frames matter and why, and they are driven by organized subsets of the public. The fact that social movements often claim to speak for the public as a whole is the result of earlier victories over contending frames, and not a position that can easily be taken by social movements or assumed by scholars. Analytical work should therefore go into better accounting for these framing contests: why is it that some frames are more powerful than others?

One way this has been approached in political science is through the idea that different institutional venues exert different biases in terms of their dominant policy outlooks and therefore the types of frames they are susceptible to or promote (Baumgartner & Jones 1991; Baumgartner & Jones 2002). In EU politics, one recent account has drawn on this insight to explain policy changes in the field of biotechnology since the 1980s (Daviter 2009). Biotechnology has variously been treated as an environmental threat, economic opportunity, and an issue of consumer protection in EU policy debates. Daviter shows that in different periods of time, each of these understandings served as the dominant frame of reference. The environmental and economic frames were dominant when the critical institutional venue was either DG Environment or the central political leadership of the Commission, respectively.

However, the consumer protection frame came up through an expansion of the conflict into new policy domains. When discussions over food safety implicated biotechnology in the policy debate, the consumer protection frame overturned the previous dichotomy of environmental and economic frames.

Daviter's account of biotechnology policy in the EU does much to show how framing and reframing processes provide the "architecture of a policy conflict" (p.1130), yet it leaves critical questions unanswered. Why did biotechnology come onto the political agenda at all in the first place, and why did the initial regulatory tasks fall to the DG Environment? Such diagnostic framing processes are likely to take place outside of the institutional venues. Daviter (and Baumgartner and Jones) convincingly show how frames *correlate* with institutional venue, but not what *causes* them to fall to particular institutions and not others. There is some indication of this when Daviter discusses the "Schnattschneiderian mode of politics" (p.1134-6). This was the political mode the conflict entered when it expanded into the realm of food safety and introduced additional actors. Short of indicating that additional actors "caused the framing dynamic to assume a new quality" (p.1134), we are not left with much insight into how this happens or why. Clearly, the account can be bolstered by a deeper consideration of the empirical regularities or logics by which these framing dynamics unfold.

A more recent treatment of lobbying and framing in the EU leaves us similarly unsatisfied regarding the dynamics of framing processes, but demonstrates the ubiquity of frame usage in EU politics (Klüver, Braun, et al. 2015), even though it is still relatively understudied (Eising et al. 2015, p.516). This in itself is surprising, given the EU's "contested competencies and competing constituencies" (p.517), which should give more room for interest groups to frame issues strategically. Based on a large data

set comprising more than 3,000 interest groups and 44 EU policy debates, these quantitative studies have provided convincing evidence of how frame usage tends to vary according to interest group type and institutional venue (Klüver, Mahoney, et al. 2015). These findings are also backed up by other studies that draw primarily on interviews (Boräng & Naurin 2015; Eising et al. 2015). What they have in common is an analytical focus on systematically describing the prevalence of frame usage among policy actors and how the types of frames used co-vary with different characteristics. The methodological sophistication is admirable and rises to the challenges of studying "the two faces of framing" simultaneously – uniting individual and collective dynamics of framing (Baumgartner & Mahoney 2008). At the individual level of framing, research focuses on the decisions that policy actors make about whether and how to frame issues in a certain manner to further their objectives. At the collective level, research looks at the overall mix of frames used in debates and how they change over time. What is missing from these accounts is a more general theory of *framing as a process*, and this illuminates a schism that can be identified between two different ways of approaching framing: the mechanistic and the ecological.

4.3.2 The mechanistic versus ecological views on framing

The easiest way to grasp the difference between the mechanistic and ecological approaches is this: the mechanistic approach focuses on outcomes, and the ecological approach focuses on process. The studies reviewed in the previous section tend towards the mechanistic approach. The goal of these studies is to establish the main effects of frame usage, and they indicate a way of thinking about the world in terms of cases and variables. They assume what Abbott (2001e) calls a "general linear reality" where causality is unidirectional and the changing properties of variables are sufficient

explanations of social phenomena. According to this logic, exemplified by Klüver, Mahoney and Opper (2015), frames are independent variables that determine lobbying success, the dependent variable. The goal is not to understand how policy actors make sense of the issues, but to explain which frame choices get the ear of policymakers. While some of the constructivist accounts depart from the vocabulary of variables, there is still a mechanistic logic underlying the research design. We see this in Daviter's (2009) account of biotechnology policy in the EU, where the goal is to establish the best explanations for shifts in policy. Daviter finds that when you consider how frame usage and institutional venue co-vary, you get convincing explanations for the observed shifts. But in both types of study, we do not learn much about the actual processes of sensemaking, meaning construction, frame mobilization, and social interaction. In other words, we do not delve into the micro-sociology of framing, which is something we need to do for the purposes of the present study.

A more ecological approach to framing would rectify this. The so-called Chicago School within sociology employed the idea of ecologies as an intermediate concept between agents and structures (Goffman 1963; Hughes 1971) – as "interactions between multiple elements that are neither fully constrained nor fully independent" (Abbott 2005, p.248). The ecological view "transcends general linear reality" (Abbott 2001e) by focusing on subjects and events rather than variables and main causes (Abbott 2001a). Such an approach coheres better with recent advances in adapting insights from complexity theory and complex adaptive systems to the social sciences (Mitchell 2009; Byrne & Callahan 2014). Furthermore, rather than ascribing interests a priori, the ecological view lets interests emerge out of social interactions. Finally, change becomes endogenous to the social process, and not an exogenous shock with

simple causal pathways. The sum of these changes add up to a more complex and holistic view of social nature, where theoretical simplicity and parsimony is sacrificed for a richer appreciation of context (Flyvbjerg 2001). Table 1 below summarizes the differences between the mechanistic and ecological logics.

Table 4-1. The mechanistic versus ecological logic.

Mechanistic logic	**Ecological logic**
Stochastic view of social reality: variables and main causes	**Narrative** view of social reality: subjects and events
Substantialist thinking: pre-defined groups	**Relational thinking:** groups emerge through interaction
Interests: ascribed a priori by reference to material conditions or organizational culture	**Jurisdictions:** competitions to control work
Change: exogenous shock, predictable response, causality is simple and direct	**Change:** endogenous social process, complex response, complex causal processes

Ecologies are groups of actors who display a homology in terms of links, work tasks (called "locations") and processes linking or securing those actors to their work tasks (called "ligation") (Abbott 2005, p.248). The concept of ecology has much in common with Bourdieu's "fields" (Bourdieu 1984), but there are also important differences.[17] In common is that they are both interested in locating actors in relation to other actors instead of considering them in unrelated mass terms; they see social position as enacted, not given by structure; and they agree that it can be analytically useful to refer to similar collections of social locations by higher-order concepts, respectively fields and ecologies. Where they differ is in the root metaphor of their concepts, fields being economic and ecologies being biological. Bourdieu also structures fields into a

[17] Abbott has made an unpublished section of a paper comparing ecologies and fields available on his website: http://home.uchicago.edu/aabbott/Papers/BOURD.pdf, accessed January 21, 2015.

dominating and dominated pole, while Abbott views ecologies as more flexible, defining the type of competition in respective ecologies as an empirical matter. Abbott also argues that fields are more static than ecologies, since the dynamism of fields comes entirely from the opposition between the two poles. Change in ecologies, meanwhile, proceeds according to the logics of trajectories and "turning points" (Abbott 2001b), where change itself has a duration and unfolds in various ways.

Actors in policy debates exist simultaneously in a number of different ecologies that link up, overlap and interpenetrate each other (Abbott 2005). To take the example of e-cigarettes, consider the multiple different work environments and social settings of Commission officials, tobacco control NGOs, public health researchers, medical doctors, tobacco company lobbyists, and online vaping communities. People within all of these ecologies are brought into contact with one another as they negotiate the disruption of e-cigarettes. Callon, Lascoumes and Barthe's (2009, p.18) notion of "hybrid forums" seems particularly apt. This is where "technical options involving the collective" are discussed – hybrid because they are heterogeneous in both the groups involved and in the ways the topics are treated (economics, physiology, ethics, law, etc.). The strength of the linked ecologies approach is this ability to handle the complex social relationships of hybrid forums that exist on multiple scales. Linked ecologies place emphasis "on the modes and processes of mediation and co-production *between* different arenas or fields" (Mennicken 2010, p.335, emphasis in original). A core part of the analysis of how disruptive innovations affect regulatory practices has to do with understanding why *these* particular actors come together in *these* particular circumstances and constellations, why they are connected to the regulatory regime in question, and how they co-constitute each other.

In this manner, the ecological understanding of framing pays attention to the social conditions and relations that undergird framing and discourse (Seabrooke 2014, pp.51–2). Discourse cannot be separated from social interaction (Steinberg 1999). Discourse and knowledge "lives through its agents" (Freidson 1986, p.217), and therefore, so does framing. Rather than focus exclusively on the frame, we should pay attention to the "conditions of possibility" (Eyal 2013, p.873) that allow the frame to be constructed and deployed. Yet, participants have agency in choosing which keys to signal, when, and how, and their feel for the game is individual and may be improved through practice as they reach higher levels of expertise (Dreyfus & Dreyfus 1986). Drawing on such ecological assumptions about social interaction, Vollmer (2013) has written extensively on how sensemaking, framing, and competition unfold during instances of disruption. I turn to his sociology of disruption in the next section.

4.4 The sociology of disruption: punctuated cooperation

Vollmer (2013, pp.1, 5) asserts that disruptions are ubiquitous in social life, and they are often prosaic and ordinary concerns that are subject to routine repair activities. However, a special set of disruptions that are seen as particularly severe, "disasters" or "catastrophes" such as revolutions or economic crises, are accorded special attention, which is not surprising from a societal point of view. This has created a "bifurcation of disastrous and therefore interesting disruptions on the one hand, and ordinary troubles on the other" (Vollmer 2013, p.26). But any complete theory of disruption should be able to account for both the mundane and extraordinary types of disruption, understanding them to be differences of degree and not of kind. This bifurcation is similar to the way technological change is treated in political science: as either an

evolutionary, everyday trend or revolutionary, extraordinary event (Howlett & Rayner 2006; Waller 1982).

To overcome the bifurcation, Vollmer argues that we should focus less on the disruptive event and more on "tracing disruptiveness", because "any collective impressed by a disruption is first and foremost impressed within a social situation" (Vollmer 2013, p.22). To trace disruptiveness, Vollmer refers to Whitehead (1929, pp.30, 50) and Abbott (2001c, p.232) in calling for an extended understanding of social situations as a "nexus of actual occasions". Disruption is not an objective, exogenous event, but an endogenous reconfiguration in social order that plays out through processes of social interaction. In other words, it passes *through* turning points rather than instigating them from outside the social context. To understand technological change as disruption, we must focus on how individuals recognize disruption, how they enact it, and how these in turn transform social order. Keeping in mind the co-construction of technology with its environment, the sociology of disruption outlined here lets us unpack the *processes* of co-construction and understand how and why certain framings of technology win out.

The entrance of disruptive innovation into social settings can be thought of as a case of "punctuated cooperation" (Vollmer 2013). The technological state of a social system imparts a set of shared expectations onto the actors about the future development of that system. Technological change disrupts those expectations, bringing about a state of punctuated cooperation "in which participants lose a previously established level of cooperation in maintaining expectations" (Vollmer 2013, p.60). Having lost a coordination equilibrium, the participants begin a scramble to re-establish cooperation by drawing on their practical sense and their "feel for the game" (Bourdieu 1990,

pp.66–67) in an effort to make sense of the situation. Vollmer (2013, pp.62–68) argues that framing is a key mechanism by which participants produce the social context necessary to re-establish coordination.

This leads to the question of how, precisely, actors attempt to solve problems of punctuated cooperation – how are frames established, and by which strategies? Vollmer suggests that actors draw on either normative, cognitive or relational keys in order to craft strategies that allow coordination equilibria to be re-established (Vollmer 2013, pp.47–62). The concept of "keys" stems from Goffman, who made use of this musical metaphor to describe the signs, symbols and resources that actors drawn upon when signaling the meaning of a social interaction. In music theory, keys are the tonic notes that form the subjective basis of a certain piece. Tension is supplied by a progression of varying notes and chords around the key, and the piece is resolved when the key note returns. In social situations, we also rely on keys to form the basis of understanding about what a situation means.

Keys resolve tension by managing expectations. Instead of musical notes, we draw on expectations about what to do that have been ingrained as a "practical sense" in our "socially informed bodies" (Bourdieu 1977, pp.123–4). The concept of keying implies the signaling of these expectations, which can be either normative, cognitive or relational (Vollmer 2013, chap.2). Normative keying is to signal expectations about an actual occasion that appeal to norms, customs and traditions. Cognitive keying is to treat an actual occasion as a source of information on which expectations can be revised. These are often contingent on elaborate and stable bodies of knowledge. Relational keying means to establish or reiterate specific relationships among participants. Putting it differently, there are three different ways of managing expectations: "defending the

standing of expectations (normative); adjusting their substance (cognitive); or making any response depend on other participants (relational)" (Vollmer 2013, p.46). Rather than reinvent the study of social norms or symbolic interactionism, Vollmer neatly synthesizes and summarizes the main conclusions with this typology.

The advantage for the analysis is that it provides a way to categorize framing strategies and study their interaction. Actors devise strategies with a respective focus on either asserting or contesting rights (normative), gathering, communicating or challenging information (cognitive), and breaking or forming coalitions (relational). For example, consider some of the different ways of negotiating the disruption of fracking: (1) a cognitive strategy would emphasize the extent of current engineering and geological knowledge to argue that risks are well understood and controllable, supporting that claim with statistics on the low incidence of well failures. (2) A normative strategy might emphasize that fracking creates jobs and jobs are good, while (3) a relational strategy could emphasize the reputation of a certain company for operating responsibly with respect to local communities. Each of these types of strategies could naturally be used to argue for the exact opposite: (1) cognitive strategies could also emphasize that we do not understand the long-term risks of fracking, (2) normative strategies could argue that it is wrong to exploit fossil fuels because of climate change, and (3) relational strategies might emphasize past environmental or corruption scandals that a company was embroiled in. These strategies are not mutually exclusive, and participants often draw on multiple different keys simultaneously, both consciously and unconsciously. Framing can thus be understood as the specific mixture and content of keys that are signaled through social interaction. Crucially, this introduces the idea that framing can be unconscious as well as conscious (or in other

words, framing is inevitable), which is a notion that goes against the grain of the earlier reviewed theories, where unconscious framing is seldom the target of observation.

To say that framing can be both conscious and unconscious is not to say that it is exclusively ephemeral – we can find evidence of frames and framing in many different places. Keys exist in the form of signs, symbols and resources (Vollmer 2013, pp.47–56). [18] At the most basic level, keys are the signs to which participants draw each other's attention. They are the pieces of information that participants believe are making a difference in how an actual occasion should be understood. In the three-fold typology, they can be either sanctions (normative), information (cognitive), or positions (relational). If participants are similarly socialized, signs can take on a more general and conventional character and be representative of sets of signs. When their deployment presupposes the existence of collectively agreed-upon conventions, they are said to be symbols. At this level, examples of normative symbols include norms, customs or morality; cognitive symbols include knowledge, competence or taste; and relational symbols include membership, status or reputation. Finally, in social systems, through the infrastructure of habitualization and socialization, symbols become even further generalized into concrete distributions of social resources. Normative expectations are thus associated with a distribution of rights or symbolic capital, cognitive expectations distribute cultural capital, and relational expectations allocate social capital. When actors invoke the distributions of these resources, they are in effect exploiting structural properties of their social systems to manage punctuated cooperation.

This discussion raises the question of power. Can we say anything about which strategies tend to defeat the others and why? Vollmer (2013, p.235) suggests that

[18] For an overview, refer back to Table 3.2.

because disruptions create uncertainty, people will often be at a loss as to which knowledge and norms apply. This means that there is a bias towards relational strategies as people look towards others that they trust for signs about how to interpret the disruption (or look to those whom they distrust for signs about how *not* to interpret it). In other words, they are basically drawing inferences from the behaviour of others. Relational strategies exploit this general tendency to create coalitions of like-minded actors. This would suggest that power lies in building effective coalitions by utilizing framing strategies that are especially efficient in linking together actors or groups of actors that hold key positions or are sufficiently large or forceful by other means (wielding large sums of capital). When Collingridge dilemmas are viewed as opportunities for sensemaking, we should therefore analyse *not the specific content of the reasons that actors give for their actions*, but *the way that those reasons link together or mobilize key groups of actors around common ideals.* In the fracking example above, this is tantamount to saying that whether or not fracking harms the environment is a less important question to answer for social scientists than to consider how certain answers set in motion certain patterns of coalition-building and institutional transformation. Those that build the strongest coalitions are successful. And this is when and how institutions are transformed: successful framing strategies supplant existing institutions or create new ones. Successful framing strategies can also defend institutions which would otherwise have been transformed.

Table 4-1 provides an overview of the typology of keys according to whether they are used to signal normative, cognitive or relational expectations. Vollmer's overall typology provides a coherent framework for studying framing strategies during periods of disruption, and it can be used to consider their interaction on a greater level of

abstraction. Connecting this discussion back to innovation governance, it implies that the sort of assessment that social scientists ought to supply does not have to do with weighing the pros and cons of an innovation on either a technical basis or a participatory basis. What we need to develop is a stronger understanding of how frames are constructed (by analysing the way cognitive, normative and relational keys are mixed) and how they derive their power (by analysing how those frames mobilize and create links between key social actors).

Table 4-2. Expectations and keys in the study of institutional change

Expectations	**Types of key**		
	Signs	**Symbols**	**Resources**
Normative	Sanctions	Norms, customs, morality	Symbolic capital
Cognitive	Information	Knowledge, competence, taste	Cultural capital
Relational	Positions	Membership, status, reputation	Social capital

Source: Adapted from Vollmer (2013, p.55)

4.5 Conclusion

The governance of disruptive innovation is negotiated in policy debates through the dynamics of sensemaking and framing. These contests are driven by actors that have a stake in the outcome of regulatory regimes that guide and constrain the development of new technologies. We have to pay attention to the micro-sociological strategies that policy actors make use of to assert dominant framings of the technology, thereby influencing how it is understood and governed. These strategies consist of deployments of normative, cognitive and relational keys. It is an empirical task to determine the

relative strengths and weaknesses of each and how they interact to build coalitions or sow mistrust.

The emphasis on the use of keys in re-establishing coordination equilibria following disruptions follows on logically from the conclusions of the last chapter. In the last chapter, I concluded that a key part of the explanation for the growing prevalence of external actors in transnational governance was the shortfall in regulatory capacity and the demands for expertise and legitimacy. These needs are increasingly being met by external policy actors working in a variety of organizational settings. Disruptive innovations challenge the governing expectations of the affected ecologies by introducing new actors, new competitive dynamics, and consequently, a great deal of uncertainty. The complexity and controversy surrounding such disruptive innovations exacerbates the need for someone to provide expertise and legitimacy to the regulatory debate. Policy actors compete to be recognized as the right group of people to serve those needs.

While the last chapter emphasized mostly expertise and legitimacy, Vollmer's theory suggests that relational keys are paramount to mobilizing cognitive and normative keys. If expertise and legitimacy are relational, as suggested previously, it becomes even more important to place yourself advantageously in the relevant social networks and to secure status, prestige, and trust. Vollmer (2013, pp.217–24) puts forward another intriguing proposition: that the uncertainty that follows disruptions devalues cognitive keys in favor of relational and normative. The discussion on complexity in the previous chapter suggested the same. When actors face great uncertainty, it is easier for others to challenge cognitive claims. Therefore, strategies that deploy relational and normative keys may be more successful. The common sense

evidence for this seems clear: if you are faced with a challenge that you do not understand and cannot see a clear way out of, you look to others to see what they are doing while relying more on your sense of the appropriate norms and morals that apply. The empirical chapters that follow will investigate how social interaction in innovation governance proceeds according to the logics of action developed here.

In the course of the chapter I identified two central implications of seeing Collingridge dilemmas as opportunities for sensemaking: (1) Collingridge dilemmas are not given – they are constructed; (2) Collingridge dilemmas are not solved – they are negotiated. The first implication concerned which institutions matter (defining the setting); the second implication concerned how those institutions are then transformed or defended (dictating the action). The two takeaways are, with respect to the first implication, that the discursive construction of the dilemma influences which groups and institutions are affected and how, and with respect to the second implication, that the action is dictated by patterns of framing and counter-framing that organize coalitions around contending normative and cognitive claims. By working with this trifecta of frames, institutions and coalitions, we can begin to systematize knowledge about how people, organizations and societies react to new innovations in ways that go beyond the predominantly economic approach taken thus far. In this direction we may find the necessary elements for putting together a program of innovation governance.

This chapter concludes Part 1 of the dissertation, which has treated the politics of disruptive innovation on a mostly conceptual level. The succession of chapters in this first part took up three tasks in turn: (1) to show that disruptions are objects of interest to politics; (2) to place these objects within the extant literature; and (3) to probe the actual processes of framing and counter-framing that drive the political negotiation of

disruptive innovations. My hope is that I have succeeded in these tasks and that, in their aggregate, these chapters suggest a fertile new research area on the intersection of innovation, politics and sociology. To start populating this research area with empirical detail and to see if my claims stand up to scrutiny, Part 2 now turns to the case studies on the disruptions of e-cigarettes and fracking in the European Union.

PART 2

VAPING AND FRACKING IN THE EUROPEAN UNION

Chapter 5

The importance of first impressions: marking disruptiveness

5.1 Introduction

There is a first-mover advantage when it comes to framing. First impressions matter in daily interactions, and this is equally true of framing in policy debates. The way policymakers first encounter an issue tends to leave a lasting imprint on the ensuing debate. This is because first frames anchor expectations about how to understand and solve an issue that become increasingly institutionalized through repeat iterations. Said differently, initial frames are strong. This chapter explores the two case studies in depth, providing a narrative walkthrough of key events while emphasizing the important role that first impressions played in anchoring the policy debates on certain grounds. When EU policymakers first encountered the issue of hydraulic fracturing for shale gas, it was through NGO pressure at DG Environment. This NGO pressure fed on broader public opposition and media attention towards fracking spawned by the *Gasland* (Fox 2010) documentary. Because of this, the issue of fracking was initially framed as a serious threat to the environment rather than an energy opportunity. E-cigarettes first came on to the EU's regulatory agenda through the proposed revision to the 2001 Tobacco Products Directive in December 2012. Confronted with a novel product that regulators in DG Health and Consumers (Sanco) had little knowledge of, they turned to key public health and tobacco control organizations for initial definitions. Here, e-cigarettes were

understood as a possible extension to the arsenal of medicinal quitting tools (such as nicotine replacement therapies, abbreviated "NRTs"). Regulating them under medicinal products laws seemed appropriate. These initial frames of environmental threat and medicinal product proved remarkably resilient in the face of multiple contestations by various actors at later stages in the policy debates.

The task of the chapter is to explain how the initial framings were settled on and why they proved so resilient. This feeds into the overall goal of the thesis by investigating the importance of the initial moves that key actors make to re-establish cooperation following the policy impacts of disruptive innovations. The previous chapter established the regulatory impact of disruptive innovation as leading to a period of punctuated cooperation and frustrated expectations on the part of participants. To realign fast-moving innovations and slow-moving institutions, policy actors deploy and respond to cognitive, normative and relational keys that attempt to make sense of the situation and resume cooperation. Framing is an important strategy in this competition to control the definition of the policy problem and the menu of acceptable remedies.

5.2 First-mover advantages in framing

This chapter contributes towards the understanding of framing as a process and conversation. As discussed in the previous chapter, the ecological view stresses that frames have durations in time and are negotiated through social interaction. Framing is intrinsic to the way actors deal with any actual occasion, through the prerogative of producing social context, which is actively negotiated and not passively uncovered (Goffman 1974; White 2008). By drawing on this ecological view of framing, I argue that the frame that first persuades key actors of its relevance will have a lasting impact

and be difficult to displace by providing the initial "building blocks" of social context.[19] This is because of the "Simon and Garfinkel principle", named after sociologists Herbert Simon and Harold Garfinkel (Collins 2004, pp.144–5).

The Simon and Garfinkel principle states that people tend to assume as normal almost anything that transpires as long as no participants actively call it into question. The principle has a solid empirical footing and has been shown to influence all manner of situations (Vollmer 2013, pp.40–7). In price negotiations for example, the person who makes the first offer tends to obtain a better result, because first offers "anchor" the negotiations around a certain price point (Galinsky & Mussweiler 2001). Similarly, experiments with decision problems have shown that when provided with a status quo context, participants will choose outcomes closer to the status quo than otherwise (Samuelson & Zeckhauser 1988). Within political economy, Blyth (2001) has discussed the power of ideas to function as "cognitive locks" that reinforce ideational or intellectual path dependencies. There are also studies on regulatory environments such as standard-setting organizations that have pointed out the importance of timing and the power of first movers (Mattli & Büthe 2003; Lall 2015). Lall, in particular, stresses the importance of technical expertise and informal social relations allowing first movers to set the agenda and reinforce their position over time. Although they vary in their terminology, all these examples build on the basic insight that social interaction revolves around expectations. There is an empirical tendency for people to be biased towards maintaining expectations (a so-called "status quo bias"), as it is easier for cooperation to continue if no one questions the validity of existing expectations. People are innately averse to the embarrassment and confrontation that might occur if group

[19] Relatedly, Weick (1995, p.36) calls sensemaking the "feedstock" of institutionalization.

expectations are questioned. If expectations are disrupted, it becomes a situation of punctuated cooperation, and participants begin to reframe the situation through the strategic deployment of keys. Once the disruption has been successfully reframed, cooperation can continue. First movers are powerful because they define what is normal.

The cases of disruptive innovation analyzed here are examples of punctuated cooperation. They are disruptive *because* there is no common set of expectations for participants to draw on initially. Social interaction in the regulatory domain thus initiates within a state of punctuated cooperation. Common expectations have to be agreed upon before cooperation in approaching the regulatory challenges can proceed. This means that the initial frame that gets presented is powerful because it defines normalcy. Following the Simon and Garfinkel principle, the first frame that key actors encounter in a situation of punctuated cooperation will be seized upon because it supplies the social context needed for actors to cooperate. The frames enter a situation with low social context, meaning that readily available keys do not suffice. This can be seen by the lack of applicable information, norms and positions concerning the regulation of fracking and e-cigs when they first became policy issues. The first frame is powerful because it lacks competition from strong, pre-existing keys, meaning that it fills a vacuum and supplies the required social context. From a situation of punctuated cooperation, it allows the run of social interaction to resume a state of normalcy.

The previous paragraph describes an ideal typical situation where the disruption creates a complete vacuum in social context and meets no competition from pre-existing keys or alternative framings. In this situation, we can expect first frames to be overwhelmingly powerful in the initial stages of negotiation. However, real life is not as

straightforward as this, and we can expect the impact of first frames to be more limited under certain conditions. First of all, disruptions are not likely to create complete vacuums of social context. Pre-existing expectations can be disrupted without completely overturning or invalidating the institutional environment in its entirety. This means that any framing of a disruptive situation is likely to encounter some pushback from actors who make sense of the disruption by drawing on a different set of keys. Disruptiveness, being endogenous to social interaction, is marked by some participants of an actual occasion towards others. Both the senders and receivers of initial frames inhabit "socially informed bodies" (Bourdieu 1977, pp.123–4), ingrained with their own histories of socialization and habitualization. When these differ significantly, we can expect more contestation during frame contests. If senders and receivers share more similar life trajectories or institutional environments, then disruptions can quickly be normalized through routine repair activities and less confrontational negotiations. In this sense, the power of first impressions is really a claim about the importance of homology within the set of participants that are affected by the disruption. When groups are small and similar, first impressions are quickly accepted as normal and reinforced through routines and institutionalization. When groups are bigger and heterogeneous, the power of first impressions is more limited in that we are likely to see more confrontational frame contests right from the beginning, where it is more difficult to make a sequential argument about which frame came first. In this latter case, it is more important to look at the outcome of initial framing *contests* and not just the importance of initial frames. Both situations underscore the necessity of tracing disruptiveness from its origins.

Resumption to normalcy in itself does not lead to inertia, however. It does not explain why it will be hard to displace the first frame (or the outcome of initial framing

contests), other than why people might be eager to accept it. The power of first impressions lies both in their easy acceptance and in their lasting impact. Once the frame is accepted, the connection to social structure through resource keys means that new connections are established and social resources distributed in a way that supports the frame. New participants to the situation do therefore not only encounter a frame in discourse, but changed arrangements of social structure and resources in support of it. The upshot is that initial frame acceptance may lead to institutional changes that have inertia and consequence for following runs of activity. When institutions change, these can in turn be signaled as "symbols" in Vollmer's terminology during later iterations of negotiation, thereby reinforcing the cycle. Accordingly, a different way to understand the progression from signs to symbols to resources is to view it as a case of increasing institutionalization (Berger & Luckmann 1968). According to the Simon and Garfinkel principle, this means that actors who enter into the situation at a later stage tend to not question the social resources and structures that have already solidified. For example, initial sanctions and information may be adopted as a baseline and enshrined as such within policy documents – later, participants may simply rely on the policy document itself as a pillar of institutional support and "blackbox" (Latour 1987) the initial information and sanctions contained within it. Actors who enter into the negotiation at a later stage are unlikely to revisit the initial assumptions that went into the drafting of the policy document, or if they do, they find it hard to work against the direction of institutional drift (and the changes in social structure and resource distributions) that was set in motion earlier. This is where inertia comes from, and why successful re-framing requires substantial mobilizations of resources to balance the institutional scales.

In the following empirical sections I will demonstrate these processes at work in the EU policy debates on fracking and e-cigarettes, in order to support the theoretical argument that initial frames are powerful. The following empirical sections draw on both interview material and document analysis in order to trace disruptiveness through "thick description" (Geertz 1973). In general, the case studies demonstrate how the initial stages of a policy debate matter for their later development. They differ in one very important regard: whereas the disruption of e-cigarettes was initially marked within a smaller group of like-minded actors, the disruption of fracking was marked on the largest possible stage of a public, media-fuelled controversy. This meant that first impressions in the e-cigarette case were able to quickly normalize the disruption and institutionalize a specific understanding of e-cigarettes as pharmaceutical devices through a number of repeat meetings involving the same groups of actors. In contrast, the fracking debate immediately polarized into extreme positions, where it became a framing contest that was largely won by the environmental groups on the strength of their cooperation and traction with public sentiment.

5.3 First impressions in the electronic cigarettes debate

Electronic cigarettes officially came on to the EU's regulatory agenda in 2012 with the revision of the Tobacco Products Directive (TPD). The first TPD was passed in 2001 with the purpose of harmonizing regulation within the Single Market for tobacco products (European Commission 2001). It covered mainly the maximum tar, nicotine and carbon monoxide contents of cigarettes, warning labels, and a ban on tobacco for oral use. The Commission's press release for the 2012 revision states three major reasons why a revision was necessary (European Commission 2012e). Firstly, a number of current provisions had become outdated due to market, scientific, and international

developments. The developments specifically referred to are: new evidence on flavorings in tobacco products and the effectiveness of warning labels, novel products such as e-cigarettes, and recent marketing strategies involving attractive packaging and flavors. At the international level, all member states also ratified the WHO Framework Convention on Tobacco Control (FCTC), which entered into force in 2005. Secondly, member states had taken a number of different approaches to some of these developments, leading to regulatory divergence. Thirdly, both the Council and the European Parliament had previously requested the Commission to revise the TPD. Before the Commission can submit a proposal for consideration by the Parliament and the Council in the co-decision phase of EU legislation, much preparatory work has to be completed, and the TPD was no exception.

5.3.1 Regulatory gaps and how to fill them

The earliest work on e-cigarettes within the EU institutions came from committees and studies reporting to DG Sanco on the threats of novel tobacco products that fell between the gaps of the current legislative framework. E-cigarettes were lumped together with other items in this category and subjected to a strong norm within tobacco control that the only new nicotine-containing products that be allowed to enter European markets should be medical or pharmaceutical ones. This is an example of normalizing a disruption by aligning it with the norm set of like-minded participants.

The first mention of the regulatory challenges of novel tobacco products dates from a 2004 report commissioned by DG Sanco on European tobacco control policy (ASPECT Consortium 2004). The report was prepared by a consortium of tobacco control organizations, mainly the European Heart Network (EHN), the European Network for Smoking Prevention (ENSP), and the European Respiratory Society (ERS),

and they were tasked with evaluating the past, present and future of tobacco control policy in the EU. The report comments on the proliferation of novel tobacco products in the USA in preceding years, expecting these to enter EU markets soon (ASPECT Consortium 2004, p.168). The novel tobacco products referred to include "reduced risk" cigarettes, heat-not-burn products (that heat up tobacco to release nicotine vapors without combustion), and smokeless (oral) tobacco products such as chewing tobacco and snuff. The report states that the current EU regulatory framework cannot meaningfully assess such products, and it concludes that new regulation needs "to examine not just cigarettes, but all nicotine delivering products across the range of delivery systems including therapeutic nicotine replacement therapies which are currently the least harmful forms but which are strictly regulated by medicines regulators" (p.168). Although e-cigarettes are not directly referred to at this point, it is clear that this report set a precedent for considering them in the TPD revision alongside other items in the "novel tobacco products" category.

In 2007, "new products" became a permanent agenda item on DG Sanco's Regulatory Committee for Tobacco Control, established under the 2001 TPD.[20] The Regulatory Committee consists of representatives from each member state's health ministry and the tobacco control unit at DG Sanco. The meeting minutes state that the participants exchanged information on various new types of tobacco and nicotine products, and that they would continue to do so over email. The timing coincides with the period in which e-cigarettes were first introduced to European markets (Pepper & Brewer 2014). A few weeks before this meeting, the Commission had completed their second report to the Parliament, Council and Economic and Social Committee on the

[20] Minutes from all Regulatory Committee meetings are available online at: http://ec.europa.eu/health/tobacco/events/index_en.htm#anchor7, accessed August 11, 2015

application of the 2001 TPD (European Commission 2007). This report also makes reference to new tobacco and nicotine products and the regulatory challenges associated with them, specifically in relationship to existing food and pharmaceutical legislation. It does not name e-cigarettes as a specific example, however.

It was not until the year after that e-cigarettes were explicitly identified as a regulatory issue at the 8th meeting of the Regulatory Committee. According to the minutes, the Commission had agreed to prepare and disseminate an orientation note on e-cigarettes, which it did in May 2008 according to minutes from the 9th meeting. The orientation note provides a legal opinion on how EU legislation applies to e-cigarettes (European Commission 2008). The note states that "several member states reported a significant increase of the sale of electronic cigarettes having introduced smoking bans earlier this year" (European Commission 2008, p.2). Many were also examining whether the product could be classified as a human medicine. The note establishes that the 2001 TPD does not apply to e-cigarettes, as they contain no tobacco. Three other directives are considered instead: the Pharmaceutical Products Directive ("PPD") (2001/83/EC), the Medical Devices Directive ("MDD") (93/42/EEC), and the General Product Safety Directive ("GPSD") (2001/95/EC). Concerning pharmaceutical products, e-cigarettes may be seen as a medicine if they, by presentation or function, are seen to alleviate nicotine addiction. It is left to national authorities to determine this on a case-by-case basis. When it comes to medical devices, national authorities must also decide whether a medical purpose can be established for e-cigarettes on a case-by-case basis. For the cases where a medical purpose is established (for example, by manufacturers making health claims), e-cigarettes could fall under the MDD if they are reusable or the PPD if they are single-use. Finally, e-cigarettes may fall under the GPSD

only if more targeted measures are not seen as applying. In this case, it would also be up to member states to establish whether a product is seen to pose a risk to the health and safety of consumers.

The orientation note, which was disseminated to all participants on the Regulatory Committee, makes two things clear. First, left untouched, the current legislative framework would lead to a fractured single market for e-cigarettes. Because of the possibility to apply different Directives and interpret on a case-by-case basis, regulatory divergence is inevitable as national authorities pursue different options. Second, the note seems to indicate an implicit preference for treating e-cigarettes as pharmaceutical products. In the final section of the note, a summary table provides an overview on how the considered directives differ on requirements for prior authorization, safety tests, and advertising restrictions. The PPD is the only option that sets specific requirements for all of these.

A September 2009 factsheet prepared by DG Sanco on tobacco control in the EU describes e-cigarettes as a new trend, "the harmful effects of which many people do not know about or take too lightly" (European Commission 2009). It also states that the Commission is considering how best to address this new challenge. In the 10th meeting of the Regulatory Committee in November 2009, the Commission advised member states that electronic cigarettes should be regulated as a pharmaceutical product. By this point in time, the preference is clear. It is also evident from the minutes that regulatory divergence has started to occur: some member states are taking the pharmaceutical products route and others are banning e-cigarettes altogether. In these preparatory stages, before work started on the actual revision process of the TPD, we already see a consensus emerging between DG Sanco, the ministries of health of the Member States,

and tobacco control NGOs of e-cigarettes as a public health risk and something to be medicalized. The disruption came up in the course of routine activities, such as meetings in the Regulatory Committee, and was quickly normalized by mobilizing the common set of tobacco control expectations shared by participants.

5.3.2 Assessing the impact of the TPD

The consensus that was reached early in the treatment of e-cigarettes solidified through repeat interaction and codification into policy documents. In other words, the medicalization of e-cigarettes became institutionalized. We see this especially in the 2009 RAND Europe study and the 2012 impact assessment by DG Sanco.

In March 2009, DG Sanco hired an external consultant, RAND Europe, to prepare a study assessing the impacts of a possible revision of the TPD. The purpose of the study was to provide input to DG Sanco's own impact assessment exercise (RAND Europe 2010). Therefore, it did not represent the official views of the Commission. When it came to e-cigarettes, the question was whether the revised TPD should be extended to regulate the category. The report makes frequent reference to the fundamental uncertainties surrounding e-cigarette use, but they are clearly framed as health risks:

> *"Recent years have seen a diversification of tobacco products in use, such as roll-your-own cigarettes (RYO) and water pipes, and the emergence of new forms of product such as electronic cigarettes. Evidence shows that consumers do not have good knowledge about the harmfulness of these products and underestimate the health risks of their use. In the case of electronic cigarettes,*

very little is currently known about health impacts, and in many Member States they are not adequately regulated" (RAND Europe 2010, p.xxiv).

However, due to the uncertainties and lack of data on the market, it is also hard to gauge the health impacts that regulation of e-cigarettes might bring. Because of this difficulty to predict the future growth and public health impact of the market, the study by necessity resorts to analyzing the potential health risks of e-cigarettes. Although the report mentions that e-cigarettes have been found to decrease the amount of toxins and particulate matter compared to conventional cigarettes, this is overruled by three specific concerns: the lacking disclosure of ingredients and composition of e-cigarettes, the inconsistency and variation in nicotine delivery, and the worry that direct nicotine delivery to the lung may increase toxicity and addictive effects (p.47). When referring to these concerns, the study cites a WHO report, to which it also refers when discussing the lack of information on the primarily Chinese producers of e-cigarettes (pp.117, 125). Their potential use as nicotine replacement therapies (NRT) is considered, but also found irrelevant due to the "major health concerns" (p.121) pointed out by the same WHO report and their potential to be a new source of nicotine addiction. A final point in the RAND study is that e-cigarettes are seen to "exploit a loophole in the regulation of many countries as they do not fall under either tobacco regulation or pharmaceutical regulation as long as they do not make health claims" (p.117).

The RAND study contributes to strengthening the earlier framings of the e-cigarette as an unregulated, potentially dangerous, and dubious Chinese export that has to be addressed. They are clearly understood to be health risks. A contending frame of e-cigarettes as safer ways to smoke faces a number of challenges. There is no data on long-term use or population effects of e-cigarettes, meaning that there are no cognitive

keys to re-orient expectations. There are normative keys suggesting that it might be a good thing to let smokers have access to less harmful alternatives (RAND Europe 2010, p.121), but they carry no weight against the authority of the WHO and the concerns they have with e-cigarettes. In addition, minutes of the 11th meeting of the Regulatory Committee, conducted in May 2010 while work on the RAND Europe study was ongoing, indicate that representatives from the Commission had been participating in WHO discussions about e-cigarettes. The discussions concerned the lack of evidence regarding the safety of e-cigarettes and the use of unsubstantiated claims in marketing. The working relationship between DG Sanco and the WHO on these issues contributed to the strength of the "e-cigarettes as health risk" frame.

Following the completion of the RAND Europe study, DG Sanco undertook public consultations from September to December in 2010, which generated 85,000 responses (European Commission 2011b). The report on the public consultation reveals that battle lines are being drawn over the topic of e-cigarettes at this point in time. Member states and governmental representatives are split on the question of whether or not the TPD should cover e-cigarettes. Public health organizations and pharmaceutical companies favor pharmaceutical products regulation and are concerned that NRTs are treated differently than e-cigarettes. Smokers' rights groups and tobacco industry representatives disagree, saying that tobacco products and nicotine products that contain no tobacco should be addressed separately. All agree that more scientific evidence is needed on the health effects of e-cigarettes, and it needs to be especially strong in order to support an outright ban. The consultation would also feed into DG Sanco's own impact assessment exercise, which was completed during 2012. In December 2012, the proposal for a revision of the TPD was published alongside the impact assessment.

In DG Sanco's impact assessment, e-cigarettes are referred to as nicotine-containing products (NCP), marketed primarily as consumer and leisure goods (European Commission 2012b, p.15). They are thereby differentiated from smokeless tobacco products (STP, such as chewing tobacco and snus), and tobacco products in general. During the course of compiling the impact assessment, DG Sanco had held a number of meetings with various stakeholders, and it is clear that their "health risk" and "pharmaceutical product" frame had been encountering resistance in meetings with the e-cigarette industry. Other than the online public consultations from 2010, this was the first point of contact between DG Sanco and the e-cigarette industry. There are also new studies available at this point in time on e-cigarette usage patterns and perceptions. These studies and industry insights both indicate that the vast majority of consumers use e-cigarettes as a harm reduction alternative to smoking and as smoking cessation aids (p.17). Meeting records between DG Sanco and e-cigarette industry representatives[21] also indicate that pharmaceutical products legislation would present two significant challenges to the industry: image problems and restrictive testing and authorization regimes. Regarding image problems, under a pharmaceutical products regime, e-cigarettes could only be sold through pharmacies and marketed as quitting devices – something that contrasts with the leisure and consumer goods branding pursued for the vast majority of products. "Medicines regulation makes the products unappealing. Meds aren't fun or cool. They're not something that you want to do" (interviewee E7).[22] Regarding the testing and authorization regimes, the worry was that most of the smaller

[21] DG Sanco met the E-Cigarette Industry Trade Association in June 2012 and Snoke GmbH & Co. KG in July 2012 (see http://ec.europa.eu/health/tobacco/events/index_en.htm#anchor6, accessed August 12, 2015).

[22] I refer to interview statements by referencing their identifier codes as defined in the interviewee tables in the appendices. References in the form "E#" refer to interviewees from the e-cigarette case, and "F#" to interviewees from the fracking case.

companies would be put out of business, due to the significant cost overheads incurred by getting products authorized.

In the face of these challenges to the pharmaceutical products framing, it remains resistant throughout the argumentation of the impact assessment. In the problem identification section on NCPs, four major issues can be identified: the poor performance of the internal market, health concerns, attraction to young people and effectiveness (European Commission 2012b, pp.25–7). The internal market for NCPs functions poorly because of regulatory divergence between member states ranging from bans, to pharmaceutical regulation, to no regulation. In addition, NCPs are seen to have an unjustified advantage over NRTs, undermining a level playing field. When it comes to health concerns, the Commission refers to fourteen RAPEX[23] notifications received by December 2012 concerning refill liquids for e-cigarettes, "indicating serious health risks" (p.26). The assessment also underscores that "nicotine is a toxic and addictive substance" (p.26) and that there have been cases of acute nicotine poisoning in children. Concerning attraction to young people, the assessment worries about innovative marketing techniques and attractive flavors such as cherry or coffee. Finally, regarding effectiveness, there is inconclusive evidence as to their success rates as quitting devices and worries that they sustain dual use habits, allowing smokers to keep up their habit in smoke-free environments.

In assessing enforcement under the current legal framework for NCPs, DG Sanco places them explicitly in the same category as NRTs (European Commission

[23] RAPEX is the Commission's rapid alert system for notifying and exchanging information on dangerous products. See: https://ec.europa.eu/consumers/consumers_safety/safety_products/rapex/alerts/main/?event=main.listNotifications, accessed January 30, 2017.

2012b, p.28). While NCPs can currently be placed on the market without any prior control, NRTs have to go through strict and costly analyses to be approved as medicinal products. DG Sanco reasons that NCPs such as e-cigarettes are marketed as alternatives to conventional cigarettes for the sole reason of "avoiding the relatively burdensome authorization procedure" (p.28). Regardless of how e-cigarettes are presented, however, the assessment maintains that e-cigarettes fall under the definition of medicinal products by function and need authorization before being placed on the market. After considering different regulatory possibilities, the impact assessment concludes that the preferred option is to regulate NCPs containing above a certain threshold of nicotine as pharmaceutical products, and those below to labelling requirements. This option is deemed effective in curbing the use of e-cigarettes as a leisure item, and reframes the category to become exclusively smoking cessation aids for all NCPs above the threshold. The threshold would be set commensurate with existing NRTs, rebalancing the playing field. For NCPs below the nicotine content threshold, there is not sufficient evidence that they constitute medicinal products. Less stringent regulatory options such as a labelling or independent authorization scheme are discarded for having lower potential positive impacts on public health. Thus, the pharmaceutical products frame has remained consistent from the first encounter in the Regulatory Committee meetings to the revision proposal.

5.3.3 The resilience of the pharmaceutical products frame

The initial framing had a lasting and powerful impact on how the Commission chose to engage on the e-cigarette question. The minutes from the Regulatory Committee meetings reveal that a common understanding of what e-cigarettes were was settled upon well in advance of the public consultation and impact assessment, which did

nothing to reorient expectations. In analyzing why a pharmaceutical products framing stabilized in these meetings, it is important to consider the types of keys that participants had available to them. The first mention of threats to tobacco regulation came in the form of "new tobacco and nicotine products" that were insufficiently covered by existing laws. E-cigarettes were not understood to be a separate product category from heat-not-burn products, new smokeless tobacco products, and reduced risk cigarettes. In public health, it has long been a top policy priority to not allow new tobacco products onto European markets, which has been the rationale supporting the continued ban on snus in the EU outside Sweden and Finland (E12a/b, E16a/b). E-cigarettes were thus initially framed as a threat that might set back past gains in tobacco control.

This is unsurprising when you consider the participants on the Regulatory Committee: "How do you convince a Minister of Health that they need another tobacco product on their markets?" (E16a). The frame is already evident in the 2004 ASPECT report, however, which was put together by a consortium of public health and tobacco control NGOs. As most of these organizations have the near elimination of smoking and nicotine addiction as their stated goals, any new tobacco or nicotine product is by default bad news. The available keys for DG Sanco to draw on therefore seem restricted by the social context and relationships in which e-cigarettes were first addressed: namely, within a group of like-minded tobacco control professionals and public health experts. Specifically, the ASPECT consortium, the Ministry of Health representatives, and DG Sanco share a strong working relationship and mutual understanding of tobacco control priorities, as evidenced by multiple interviewee statements and TPD revision meeting records. E-cigarette companies and users had no access to DG Sanco before

2012, despite numerous attempts to do so (E7, E18). In responding to the disruptiveness of e-cigarettes, the health risk and pharmaceutical products frame was the most conducive to allowing cooperation to continue. This also demonstrates the clear connection between social resources and structure and frame development: not only was the health risk frame effective in reestablishing expectations within this group, it also secured them future areas of regulatory work and therefore access to the attendant capital that can be claimed by controlling this work. The health risk frame mandates strict regulation and grants authority to those who can administer this.

The clear lineage from these earliest encounters to the 2012 proposal can be explained by the graduation of initial signs into symbols and resources. Meeting minutes demonstrate that early encounters with new tobacco and nicotine products led to rounds of information sharing as participants pointed to cognitive signs of what was going on and what it meant. The 2008 orientation note played a prominent role in solidifying these signs into more concrete expectations about e-cigarettes. Because they did not fit tobacco products legislation, the implicit assumption of the note is that the other categories are more appropriate, especially the PPD. The note only makes reference to the potential harms of e-cigarettes by mentioning that "they have the potential to undermine the smoking cessation policies, since they keep the smoking addiction" (European Commission 2008, p.2). This simple statement displays the assumptions driving the Regulatory Committee: they are dangerous, and they threaten years of our hard work. The initial cognitive signs have given way to normative re-keyings. It is now clear that there is a threat and we ought to do something about it. These expectations travelled from these early settings into important policy documents such as the RAND Europe study and the impact assessment.

Alternative framings of e-cigarettes as harm reduction tools did not have a chance, because the members did not have access to the keys that would support such a framing. Harm reduction in tobacco control was seen as a very controversial idea at the time, especially among public health and tobacco control NGOs (E11). For the Regulatory Committee members, the ultimate source of authority on tobacco control is the WHO, and the 2009 report referenced in the RAND study (World Health Organization 2009) supports pharmaceutical regulation and suggests prohibiting claims that they are effective smoking cessation aids or that they are less harmful. WHO has since allowed for a more nuanced picture of e-cigarettes (World Health Organization 2014), but at the time, the health risk frame was very clear. The initial health risk frame distributed expectations and resources in the DG Sanco tobacco control ecology such that studies and impact assessments in following years were predisposed to draw on the same framing. Inertia was guaranteed on the solidifying relationships and norm alignment between DG Sanco, tobacco control NGOs, and the WHO.

As we turn now to the fracking debate, we will learn that such insulation from outside challenges during the early stages of a disruption is by no means guaranteed. When contestation and politicization is the order of the day as soon as the disruption is marked, it is harder for first impressions to solidify into a set of shared expectations within a group. In this case, it becomes more important to look at how the initial clashes between different frames play out.

5.4 First impressions in the fracking debate

The regulation of unconventional hydrocarbons entered EU policymaking differently than e-cigarettes, which were brought up in the course of routine TPD revision

activities. In the early days of e-cigarette regulation, before the 2012 proposal was submitted to the Parliament and Council, e-cigarettes were not seen as a major policy issue, and certainly not as something that would threaten the entire directive in future negotiations (E1a/b). In contrast, the decision to place fracking on the Commission's work plan seemed to derive from outside pressure at the earliest stages already. This constitutes a very different marking of disruptiveness compared to the insulated, routine activities in the e-cigarette case. To understand where this public pressure came from, it is important to consider the impact of the 2010 documentary *Gasland* (Fox 2010).

5.4.1 Gasland and the fracking controversy

Gasland investigates the impact of natural gas drilling with hydraulic fracturing on communities in several American states. Josh Fox, the director, was spurred to make the documentary when his parents received a letter from a natural gas company offering to lease their land in Pennsylvania for $100,000 to drill for gas. This sends Fox on a journey across the American natural gas fields to interview citizens living in areas with fracking operations. The citizens recount stories of chronic health problems and contamination of their air and water – some of them have succeeded in obtaining court injunctions or settlement money from natural gas companies after frack operations affected their water supplies. In a memorable scene that circulated on social media, a man lights his faucet water on fire and claims that natural gas drilling is responsible for this.[24] The incident has been used as a rallying cry for environmental movements and organizations (see for example, Food and Water Watch n.d.), and has since then become the target of much debate and controversy (Economides 2011). Entire web sites and even documentaries have been devoted to rebutting the claims made in *Gasland* (Energy

[24] The clip can be viewed here: http://www.nytimes.com/video/arts/television/1247468091675/excerpt-gasland.html, accessed August 17, 2015

in Depth 2011; McAleer 2013). On the "Frequently Asked Questions" area of *Gasland's* official website, two questions are devoted to flaming faucets.[25] To say that *Gasland* sparked an international debate about fracking would be an understatement – the birth of the global anti-fracking movement is directly related to the movie (EcoWatch 2013). Prior to *Gasland*, anti-fracking activism was local, grassroots, and off-the-radar. After *Gasland*, more than 200 celebrities have joined the Artists Against Fracking movement, including Yoko Ono and Sean Lennon.[26]

The anti-fracking movement originated in the American resistance to the rapid development of the fracking industry in the U.S., but it quickly spread to other parts of the globe (Steger & Milicevic 2014). International environmental organizations were instrumental in bringing the issue to the forefront of energy debates in several regions. For example, environmental organizations arranged regular screenings of *Gasland* throughout France in 2010 ahead of the national moratorium on fracking (Weile 2014). In this manner, the American experience set the precedent for how fracking was perceived in other regions. This means that both positive expectations for a "shale gas boom" and negative expectations of environmental risks seemed vastly out of proportion to the low level of activity going on outside of the U.S. The European debate was thus quickly polarized into these extremes, even though the number of shale gas wells being drilled or planned is low to this day.[27]

Direct evidence of the impact of *Gasland* on the European policy debate is available. In September 2013, the Greens/European Free Alliance (Greens/EFA) group

[25] See http://www.gaslandthemovie.com/whats-fracking, accessed August 17, 2015
[26] See http://artistsagainstfracking.com/about/, accessed August 17, 2015
[27] See a list over disclosed wells in the EU here: http://www.ngsfacts.org/findawell/list/, accessed August 17, 2015

in the European Parliament invited Josh Fox to screen *Gasland: Part II* (Fox 2013) at a public conference on unconventional fossil fuels extraction. The purpose of the event, which was named "Unfracked", was to "debunk myths" about the possible benefits of shale gas production in order to support an EU-wide ban on the industry (The Greens/European Free Alliance 2013). The Greens/EFA had been calling for a ban of fracking already one year before the screening of the *Gasland* sequel. In September, 2012, they launched an information campaign together with three environmental groups: Friends of the Earth Europe (FoEE), Food and Water Europe (FWE), and the Health and Environment Alliance (HEAL) (The Greens/European Free Alliance 2012a). The launch coincided with a Food and Water Watch (the American parent organization of FWE) initiative to advocate an international day to stop fracking, the "Global Frackdown", held in the autumn of every year since 2012. This is another indication of how the American experience was translated to a European setting, specifically through network ties between international environmental organizations, the agenda-setting power of popular documentaries, and social media. For the Greens/EFA, the Global Frackdown and the collaboration with NGOs undoubtedly presented an opportunity to profile their MEPs and bring attention to a topic that their constituents cared about (or would soon care about).

The information campaign that was launched by the Greens/EFA and their NGO partners consisted of a webpage on the StopClimateChange.net site (a climate change website hosted by the Greens/EFA) on which the campaign items could be viewed (The Greens/European Free Alliance 2012b). They consisted of a "Fracktivist's introduction to EU legislation", the NGO's joint statement on shale gas, a YouTube video on fracking, a leaflet on banning fracking, and a document with background information on

fracking. The materials have been prepared in close collaboration between the partners, except for the NGO statement, which is an important document. Published in April 2012, it predates the other campaign materials by almost half a year. According to interviewee F1, who participated in the preparation of the document, this was the outcome of several months of preparation and discussion among the NGO partners, who agreed in the end of 2011 to bring it onto the agenda of EU policymaking. It was thus an exercise in expectations management, where the NGOs agreed on a common and coherent frame with which to present fracking to the public, namely as a sustainability threat.

By sustainability threat, I mean to imply two things: not only is fracking presented as a threat to the environment, it is also a threat to a timely transition to a low-carbon economy. This is apparent in the inclusion of the "Climate" and "Energy" arguments in the document's list of concerns about fracking. From the release of *Gasland* to the screening of its sequel in the European Parliament, there is thus a clear trajectory of framing fracking as environmental threat that travelled from an American context to the European policy debate by way of environmental organizations and Green parties. It is another good example of how homologous actors can utilize disruptions as opportunities for cooperation, for institutionalizing a set of expectations, and for reinforcing particular social orders. Specifically, they frame the disruption in a way that creates a problem for them to solve, increasing their relevance and reinforcing relational ties between them. When disruptions involve a more heterogeneous set of actors, their interactions seem to tend more towards increased contestation rather than cooperation.

5.4.2 Fracking encounters institutional complexity

While the trajectory from *Gasland* to the NGOs and green parties in the EU presents a clear trajectory, the picture is muddied when we look at the other EU institutions and their encounters with the fracking question. The initial engagement in the European Parliament (EP) resulted in a 2011 study on the impacts of shale gas on the environment and human health (European Parliament 2011). This study drew explicitly on the American experience to identify a number of risks and the gaps in European legislation. The study recommended that shale gas and oil activities be dealt with in a dedicated Directive owing to the complexity of the activities. The framing seems consistent with the Green/NGO "sustainability threat" frame that came out of *Gasland*, but later in the EP, it became apparent that two camps had emerged on the shale gas question.

In December 2012, the plenary session referred the question of shale gas to be taken up in two different committees: the committee for Industry, Research and Energy (ITRE), and the committee for Environment, Public Health and Food Safety (ENVI). Both committees worked in parallel on opinion reports about the industrial (European Parliament 2012b) and environmental (European Parliament 2012a) impacts of shale gas, respectively. According to interviewee F1, the plenary session had not been able to agree on which committee the shale gas file belonged, leading to the compromise of granting it to both. This indicates that there was at least two frames in contention in the Parliament at this stage, and that neither had succeeded in dominating the other. The reports agreed on some points, but diverged on others. They agreed that all shale gas activities should undergo an environmental impact assessment regardless of scale or duration and that public consultations and transparency are paramount in ensuring the sustainability of projects. When it comes to enforcement, however, the ENVI committee

called for a harmonized EU legal framework, while ITRE believed that it should be left to the companies to agree on and follow a set of best practices. Both studies asked the Commission to further analyze the issue of shale gas and how to regulate it. The decision to treat fracking in both the ITRE and ENVI committees is highly indicative of the polarization of the issue into staunch anti- and pro-fracking camps.

During 2012, the Commission had begun its information gathering process on shale gas as a background for decisions on possible next steps. The decision to gather information on shale gas was motivated in part by a February 2011 call from the Council to assess the possibilities of developing shale gas in Europe.[28] In September 2012, it released three studies: one on climate impact, one on energy market impacts, and one on risks for the environment and human health. The climate and environment reports were prepared by external consultants for DG Climate and DG Environment, respectively. The Commission's Joint Research Centre prepared the energy markets report. In a press release, the Commission concludes that while the energy markets report noted considerable uncertainties about recoverable volumes, technological developments, public acceptance and access to land and markets, the environmental report was clear in identifying "the need for an appropriate framework to enable a sustainable shale gas extraction in Europe" (European Commission 2012d).

Under EU law, the Commission has no say in how member states choose to exploit domestic resources and make up their energy mixes. However, EU environmental law has clear Directives on water use, mining waste, emissions and air quality, for example, which would apply to fracking operations. The 2012 environmental study concludes that there are inadequacies in the current body of

[28] See http://europa.eu/rapid/press-release_DOC-11-1_en.htm?locale=en, accessed August 18, 2015

applicable EU law "that could lead to risks to human health and the environment not being sufficiently addressed" (AEA Technology 2012, p.119). The environmental threat framing is evident in the report's use of a risk assessment methodology, and interestingly, the press release reveals a similar assumption about the Commission's legislative duties going forward: "The studies published today will inform ongoing work examining the need for a risk management framework for shale gas developments in Europe and, if necessary, the form it might take" (European Commission 2012d). The Commission is clearly thinking in terms of risk mitigation at this stage, which is supported by how unconventional fossil fuels were incorporated into the 2013 work program.

The Commission's 2013 work program included an objective called "Using Europe's resources to compete better" (European Commission 2012a). The purpose of the objective is to discover better ways of being "more innovative, productive and competitive whilst using fewer resources and reducing environmental damage". Initiative number 41, a subcomponent of this objective, calls for an "Environmental, climate and energy assessment framework to enable safe and secure unconventional hydrocarbon extraction".[29] At first glance, it seems that the Commission has lumped the three different concentrations of its 2012 studies into a single assessment framework, and they view the benefits of such a framework as contributing towards both competitiveness and energy security. Judging from the work program, the Commission intends to cover all its bases. There are elements in this initiative pertaining to the environment, climate, energy, industry and competitiveness. The question, then, is to which DG should the initiative be delegated? The task fell to DG Environment,

[29] The list of initiatives can be found in the Annex to the work program.

although DG Energy would have been an equally probable candidate. The answer lies in the Commission's changing understanding of how fracking fits within the body of EU law, especially by DG Environment.

In order to trace how the Commission changed its perspective on the regulatory challenges of fracking, it is important to consider negotiations on the Environmental Impact Assessment (EIA) Directive and related studies. This Directive applies to all projects that have a significant effect on the environment, and it lists specific projects in its annex which must carry out a mandatory EIA. In 2011, the Commission issued a guidance note on the application of the EIA Directive to projects related to the exploration and exploitation of unconventional hydrocarbons. In the note, the Commission services are of the opinion that the EIA Directive applies in its current form, but a mandatory assessment is only required for natural gas projects exceeding 500,000 cubic meters extracted per day, which puts unconventional exploration projects well under the limit (European Commission 2011a). Another guidance note from early 2012 by Environment Commissioner Potocnik to the Parliament's ENVI Committee advises on a number of other environmental laws that already apply to unconventional hydrocarbon projects, in addition to the EIA Directive (Potocnik 2012). The note does not mention or indicate any gaps in EU legislation. Other studies also find the Commission reflecting on its legal duties when it comes to unconventional hydrocarbons. A study for DG Energy by an external law firm from November 2011 looked at the application of EU law in four member states (Philippe & Partners 2011). This study also concluded that an adequate environmental framework was already in place.

In the fall of 2013, the Commission, in particular DG Environment, had completely changed its stance. A study undertaken for DG Environment by an external consultant looked at the regulatory provisions in eight member states and found a number of areas of legal uncertainty and possible limitations (Milieu Ltd. 2013). In a speech in October 2013 at the Financial Times Global Shale Energy Summit, Environment Commissioner Potocnik discussed the need for a "European strategy for shale" and the possible benefits and concerns that have arisen (Potocnik 2013). He concludes that the previous two years of studies have led the Commission to believe that "an EU-wide risk management framework for unconventional fossil fuels extraction, with a view to ensuring that harmonised provisions applying across all Member States, would best address the above concerns". Also in the fall of 2013, the European Parliament had voted in favor of amendments to the EIA Directive that would include shale gas exploration projects in the list of activities requiring mandatory EIAs (European Parliament 2013). According to interviewee statements, the negotiations on the EIA Directive were "hijacked by shale gas - it wasn't in there originally, but it became a part of negotiations due to the political nature of the debate" (F4).

What had changed between early 2012 and late 2013 was the increasing politicization of the issue, which became apparent especially when the EIA Directive was being discussed in Parliament. "Shale was included into the directive for political purposes, so MEPs could say to their electorates that they were active on shale issues" (F2). Ultimately, shale gas exploration projects were taken out of the annex of projects requiring mandatory assessments due to a blocking minority in the Council (especially the shale gas-active member states of UK and Poland), who threatened to scrap the entire legislation if it stayed in (F1, F4). The EIA Directive negotiations showed that the

shale gas debate had changed markedly since earlier years. It had become "the most contentious battle with the environmental lobby and DG Environment" that the oil and gas industry had seen thus far (F6). It pitted environmental groups drawing on momentum with the public against the oil and gas industry and certain Member States who had a direct interest in developing their shale gas reserves. These high-profile players clashed very publicly right from the earliest mentions of shale gas in the EU, providing a very different policy environment for regulators to navigate. Specifically, it was impossible for first impressions to really set the tone within the Commission owing to the presence of multiple contending frames. However, the agenda-setting power of the *Gasland* movie and subsequent mobilization by green groups should not be discounted.

5.4.3 First impressions and public sentiment

To understand the increasing politicization of shale gas in the EU, we have to return to the alliance between the environmental NGOs and Green MEPs born out of the success of the *Gasland* documentary. The push to make EIAs mandatory for shale gas projects came from this alliance, with indications of collaboration with DG Environment. This is supported by interviewee statements: "The EP was pushed to include shale in the amendments due to Friends of the Earth Europe pressure partly" (F1). Friends of the Earth Europe and Food and Water Europe started advocating this issue already in February 2013, when they release a co-authored review of the gaps in the EIA Directive in relation to unconventional fossil fuels (Food and Water Europe & Friends of the Earth Europe 2013). Other interviewees mention that shale in the EIA Directive "was probably a Green initiative stoked by DG Environment" (F10). More broadly, there is consensus that "NGOs are the ones who brought shale on to the agenda through MEPs"

(F6). The NGO/Green alliance started to devote more resources to the issue in late 2012 with the onset of their collaborative information campaign discussed previously, and they were successful in politicizing the issue to the point that inaction was not an option. "We discussed in DG Environment that if the commission adopted a wait-and-see approach to shale gas regulation, then we couldn't be blamed if things went wrong even though operators were adhering to our guidelines. But the issue was too sensitive to the public, and there was political pressure to do something" (F4).

The power of first impressions is also at work in this narrative, albeit slightly differently than in the e-cigarettes case. *Gasland* provided a keying of fracking that facilitated cooperation on the issue in the NGO/Green alliance in a way that was conducive to getting the ear of DG Environment. Equally important, however, was the fact that *Gasland* provided publicly available keys that made it easy to frame fracking as environmental threat in a way that resonated with the public at large. In contrast, there was no widely available, public documentation of fracking benefits for the industry to signal in Europe. The analysis shows that fracking became very topical and contentious in the EU during the EIA negotiations. In the context of the EIA Directive, only the environmental threat framing was relevant. In contrast, the energy opportunity framing had only been discussed in the ITRE Committee in Parliament. It was a more contained framing that lacked the publicly available keys to go wider, and it was constantly under pressure and on the defensive from the environmental threat framing which had arrived earlier. A surprisingly numerous amount of interviewees[30] from different organizational settings all indicated that *Gasland* initiated and had a lasting impact on the European policy debate. "It's very difficult to dislodge facts once they have been assimilated…

[30] Interviewees F1, F5, F6, F7, F8, F9, F11, F13, F14 all make direct references to the impact of *Gasland*.

Every meeting I go to with policymakers has to start with a debunking of the burning tap incident in *Gasland*" (F6). The earliest cognitive and normative signs indicating the threat of fracking were cemented into more robust symbols and resources such as concrete alliances, information campaigns, policy briefs, fact sheets, and so on that provided an institutional framework facilitating the work of anti-fracking campaigners. The same mobilization of keys to support the energy opportunity framing was too little, too late. What this suggests is that when disruptions go public, it is rather the outcome of initial framing *contests* rather than the presence of initial *frames* that matters. In this contest, the ability to mobilize and leverage public sentiment is paramount. That work was certainly easier for those attacking a stigmatized industry compared to those defending it.

5.5 Conclusion

The purpose of this chapter has been to demonstrate the extent to which we can speak about first-mover advantages in framings on disruptive policy issues. This is important in the context of disruptive innovations, because framing is integral to reestablishing expectations under conditions of punctuated cooperation. Drawing on cognitive, normative and relational keys, frames tell us what is wrong, what should be done, and by whom. I drew on the concept of keys in order to demonstrate the links between frames and social structure. Initial frames are powerful and have inertia because of the changes they can make to social structure when expectations solidify through institutionalization. When initial frames bundle a collection of signs together to present a common understanding of an issue, they are simultaneously indicating expectations about more general symbols and resources that can be brought to bear on an issue. If the frame is accepted, social structure changes and inertia follows. This is what we see

when specific risks of e-cigarettes or fracking are pointed out and made the prerogative of certain institutions, experts or laws to address. Different framings result in different structures.

The two case studies display similarities and differences when it comes to considering the importance of first impressions in policy debates. In common is the fact that initial frames were effective in solving or facilitating cooperation between *like-minded* actors. Initial frames in the e-cigarette example were quickly agreed upon due to the homology of the actors involved and the isolation of meetings in the Regulatory Committee from the wider policy arena. The actors had similar keys at their disposal with which to frame e-cigarettes, and the medicinal products framing reestablished cooperation by allowing work in the committee to continue. It was the easiest way to understand and deal with the issue, and not something standing in the way of any of the actors' agendas. This initial understanding had a lasting impact because it was institutionalized in the form of official studies and policy documents that kept reiterating and supporting an interpretation of the e-cigarette as a pharmaceutical product. Up to a point, the Simon and Garfinkel principle ensured that new policy actors took this understanding as the baseline.

In the fracking case, we also saw how the disruption provided an opportunity for cooperation between like-minded actors. Framing fracking as environmental threat brings it within the jurisdiction of both Green MEPs and environmental organizations. There is an empirical tendency for actors to frame a disruption in a way that makes it their job to address it – allowing a continued or new accumulation of different capital types on which their social survival depends (for example, money, prestige, authority or knowledge). First-mover advantages in framing matter because it is a race to establish

jurisdictions, control capital, and build the supporting institutional architecture. *Gasland* ensured that the green groups got a head start on this by making it a policy issue before any shale gas fracking was even going on in Europe.

Although such a head start may give one coalition an advantage over another, it does not automatically ensure that their particular framing will carry the day. Because the fracking debate was public from the beginning, it was also contested from the beginning, and environmental threat frames were immediately challenged by economic opportunity frames. In contrast, e-cigarettes were initially seen as an uncontroversial item in the TPD, and were first exposed to wider scrutiny during later stages of the revision, after which initial framings had already been settled. In the initial stages of that debate, regulators within DG Sanco could unproblematically adopt the pharmaceutical products framing with little fear or expectation that anyone would challenge that call. Had the Regulatory Committee meetings been less isolated and homogeneous, they would certainly have been challenged (as they later were). In the public controversy of fracking, however, the many-headed hydra of the Commission could not initially decide which DG should lead the shale gas dossier. Different DGs were inclined towards different framings. What clinched the deal for DG Environment was the public contentiousness of the dossier, and that ultimately meant that publicly available keys favored the environmental threat framing facilitated by *Gasland*. Having DG Environment address fracking was a way of assuaging public concerns and enhancing the perceived legitimacy of the Commission – but it must also be seen as a victory for the green groups (and for first impressions) who moved quickly to make fracking both a public and political concern.

The case studies thus suggest that controversy and scrutiny by the media and the public has a great deal of bearing on how framing contests evolve. Initial frames are strong, but are harder to settle when under conditions of controversy. This is the main contribution of the chapter to the existing political economy literature on first-mover advantages in policymaking and regulation (e.g., Blyth 2001; Mattli & Büthe 2003; Lall 2015): that venues and degrees of public interest and access greatly qualify the process by which first frames *come to matter* (see also Littoz-Monnet 2014). A sensemaking approach, such as the one employed here, lets us view these processes in greater detail by observing how frames travel between actors and venues and compare where they meet fierce resistance with where they are quickly accepted. This means that in some cases, we have to look at the outcomes of initial framing *contests* and not just initial frames. The next chapter takes up the theme of controversy and in particular the interplay between science, expertise and emotions in policy debates. I now move from the expansive stage of the issue life cycle, where issues enter the policymaking agenda, to the transformative stage, where issues are negotiated and concrete policy proposals are debated. To understand actors' interpretations of the policy issue, I rely much more on interview data in the next chapters.

Chapter 6

Expertise and the framing of risk: cognitive framing strategies

6.1 Introduction

The previous chapter established how and why the outcomes of initial framing contests can have lasting impacts on policy debates. This is because initial frames distribute keys, or expectations, in a specific manner, which become institutionalized and taken-as-granted. This distribution then sets the terms of engagements for further runs of social activity or iterations in the policy debate. Institutionalized keys have inertia and afford relative value to different framing strategies. But even if there is inertia, this does not mean that first impressions are immune to challenges.

In this chapter, I address the question of how initially dominant frames are successfully challenged. Expertise plays an important role in this, and the chapter will investigate how to understand expertise and how it gets deployed in framing strategies. When certain policy actors come to be regarded as experts on an issue, they are in a better position to argue for policy change (Broome & Seabrooke 2015). However, the case studies also suggest that there is a limit to what expertise can achieve. In framing contests, expertise does not automatically trump other factors. Interviewees often referred to the particularly emotional character of the policy debate, and they would go to great lengths to characterize their opponents as the emotional ones and themselves as

rational. In spite of this, there was agreement that emotionally charged arguments often had a significant effect on the debate by, among other things, eliciting support, motivating change, or justifying positions. It is curious that emotions are granted a powerful role in framing contests, even though policy actors are reluctant to admit to consciously appealing to emotions. There is a strong norm to be seen as acting rationally, objectively, and in the public interest.

This chapter and the next one deal with the second stage in the issue life cycle: the transformative stage. Where the expansive stage is concerned with how issues come to life and are taken up by policy actors, the transformative stage deals with the day-to-day work of negotiating and designing actual policy responses. What sets the transformative stage of the issue life cycle apart from the expansive stage is the proliferation of frames as more actors begin to enter the debate and engage in earnest (Snow et al. 2007). In the present study, this is more dramatic in the case of e-cigarettes than in fracking, but it is true of both. The next section sets the scene for the chapter by discussing how the literature has treated expertise and emotions in framing contests. I develop a typology of framing strategies according to their emphasis on cognitive, normative or relational keys, and whether they support or reject risk objects. Following this, I analyze the use of cognitive framing strategies by interviewees in both of the case studies, also paying attention to how actors make use of emotions and expertise to challenge or uphold different frames. I find that cognitive framing strategies quickly reach their limit in Collingridge dilemmas. When the state of knowledge is easily contested, policy actors must rely on normative and relational signals to gauge the validity of claims and build coalitions.

Indeed, it seems that norms and relations prior to the disruption imply a "deep structure" to the policy debate from which cognitive framing strategies are drawn to fit with actor positions. The strong version of this claim is that cognitive keying is completely instrumentalized to fit with pre-existing interests, norms and relations. The weaker version, which the cases demonstrate as being more accurate, is that cognitive, normative, and relational signals interrelate in patterns which can be made the subject of empirical enquiry. Cognitive frames may be influenced by the "deep structure" in some cases, but it may just as well happen that scientific information changes the prevailing set of norms and relations. Chapter 6, as mentioned, looks more closely at cognitive framing strategies, but in Chapter 7 I turn to the deep structure of policy debates: the underlying normative and relational expectations and the framing strategies that mobilize these. Together, these two chapters make up a smaller set within Part 2 of the dissertation that takes a closer look at how the interviewees framed the disruptions and negotiated their meanings.

6.2 Disruptive innovation as risk

The regulatory problems of disruptive innovations arise partly as a result of scientific estimates of the risks they pose. In both case studies, the primary means by which the issues of fracking and e-cigarettes were constructed as problems and made governable was through scientific attention to the risks that the technologies presented. In the case of e-cigarettes, this was evident in the strong stance taken against them in the tobacco control ecology and the calls for pharmaceutical regulation. In the fracking study, the risks of air and groundwater pollution, seismicity, and so forth were communicated primarily by activists and Green politicians who made frequent reference to scientific studies to back up their claims. Science played an important role in providing cognitive

keys for framing strategies. As indicated above, however, science and experts also encountered surprising limits on what they could achieve, especially in the face of what were characterized as highly polarized and emotional debates. This begs us to consider how science, expertise and emotions interact in framing contests. It is convenient to approach this topic through the sociology of risk, based on the intuition and observation that science enjoys a privileged position when framing risks, but a neither insurmountable nor absolute one. My departure point for this section is therefore the nature of risk and the role of science in its construction.

The sociology of risk emphasizes that risks are always situated within a social context and are therefore linked to actors' activities (Lidskog & Sundqvist 2012). Because society is differentiated, risks are differently perceived by different societal actors. The sociology of risk therefore objects to the traditional understanding of risk assumed by "technical risk analysis" (TRA). TRA implies that risks exist objectively outside society and can be adequately measured and communicated by scientists. One group of experts might measure the risks, leaving it up to another group of experts to calculate the costs and benefits of addressing the risk. Political priorities can thereafter be based on these measurements (Power 2007). Because these scientific approximations are taken as given and left unquestioned, TRA is a wholly un-sociological view of risk and is neither conceptually nor empirically satisfactory for the current exercise. It assumes that scientific knowledge can provide complete and objective accounts of risk profiles that are universally acceptable. In previous chapters, I have already established that frames and perspectives matter – we must go beyond the purely technical and dive into the social.

In spite of numerous critiques of TRA (Slovic 1987; Kasperson et al. 1988; Irwin & Wynne 1996), the prevailing approach to risk governance in modern societies overwhelmingly builds on TRA and the public deficit model (Irwin 2006; Lidskog 2008). This "deficit model of public understanding of science" assumes that science is produced within a closed circle of experts and then disseminated to the public, who are often unable to properly understand the science (Irwin & Wynne 1996). TRA and the public deficit model make up a core part of the modern "civic epistemology", that is, the way in which the robustness of knowledge claims are assessed in a society (Jasanoff 2005). If we follow the assumptions of the social construction of risk, it is not enough to assert that TRA and the deficit model are inadequate – we must ask what these models do. What are the practices that sustain them, and what actors and relationships support them? The short answer is that TRA and the assumptions of the deficit model allow experts to frame an issue as falling under their control, and organizations can claim legitimacy by delegating risk management to the experts. To conceptualize an object as a risk is to make it governable (Hood et al. 2001).

Risks imply a calculated uncertainty. They have their basis in "a situation or event where something of human value (including humans themselves) has been put at stake and where the outcome is uncertain" (Rosa 1998, p.28). As discussed above, there is no straightforward way to make these calculations within contested social and political settings. Risks are contextualized differently, and different values are placed on their causes, consequences and mitigation strategies. We should therefore be careful not to disavow or relativize scientific and expert statements, but consider them as crucial elements in framing strategies that compete with other forms of normative, cognitive and relational keying.

Seen in this light, risks are framing devices that turn "an open-ended field of unpredicted possibilities into a bounded set of possible consequences" (Boholm 2003, p.167). Risks are neither objective nor subjective, but relational, consisting of three codetermined parts: a risk object, objects at risk, and a relationship that causally connects the risk object to the objects at risk (Boholm & Corvellec 2011, p.179). Risk objects are sources of harm, and the objects at risk are the targets of that harm. Actors construct these links through framing strategies, and all three aspects of the risk relationship are created simultaneously (p.181). This means that things cannot constitute a risk in and of themselves – they are always configured in semantic relationships (or framing strategies) that include valued objects at risk and some causal connection that shows how those valued things are threatened by the risk object.[31] Boholm (2003, pp.171–172) identifies three types of framing strategies for dealing with risks under conditions of high uncertainty: faith, precaution and avoidance. Faith strategies get around the problem of uncertainty by placing trust in those responsible for managing the risk or in some other principle or force. Precautionary strategies adopt various measures to control, ban or otherwise regulate a possible risk. Avoidance strategies construct a dichotomization between risk and safety, implying that the risk object should be avoided and can never be made safe.

We can apply the typology of keys utilized in the theoretical framework of the thesis to construct a typology of framing strategies for coping with unknown risks. The

[31] Although they are related, the relational theory of risk addresses a shortcoming of the cultural theory of risk put forward by Douglas and Wildavsky (1983). Cultural theory has been criticized for its functionalist explanation of why people come to form the beliefs they hold (Boholm 2003; Kahan 2012). It problematically and tautologically attributes agency to collective entities by saying that people form risk perceptions congenial to their way of life *because* those perceptions cohere with and promote their way of life. Relational theory and the psychometric school are opening up the black box of culture by investigating the social and psychological mechanisms or processes that intervene between culture and risk perception. Relational theory focuses on framing and social interaction, while the psychometric school looks at psychological processes within the individual. They operate on different scales.

faith strategy thus emphasizes relational keys, the precautionary strategy emphasizes cognitive keys, and the avoidance strategy emphasizes normative keys. However, these three strategies each have a mirror image, which Boholm fails to identify. The different key emphasized by each strategy respectively can be modulated in a positive or negative direction. In other words, you can cope with unknown risks by either supporting them or rejecting them. All coping strategies carry within them an evaluative assessment of the risk object as something inherently good or bad. This is because "there is no risk assessment without normative evaluation" (Rescher 1983, p.31): to be at risk, an object must be ascribed some kind of value.

When cognitive strategies reject a risk object, the cognitive frame emphasizes the inherent incalculability of the risk or the insufficiency of our knowledge to argue for its strict regulation or prohibition. This is an example of a negative modulation of the cognitive frame, which we can call precaution. It is similar to the way the European Commission thinks about the Precautionary Principle: this principle is invoked to legitimize regulatory measures taken on the basis of the inherent uncertainty and possible harm of the risk object (European Commission 2000). In contrast, cognitive strategies that are positively modulated in support of the risk object emphasize the calculability of the risk and identify measures we can take to effectively decrease the probability of an adverse occurrence. This strategy can be called prevention, which is closer in line with how EU law thinks about preventive measures taken to protect the environment ("the Preventive Principle").[32] The difference between precaution and

[32] This principle is implicit in both primary and secondary EU law. For primary law, see articles 191-193 of the Treaty on the Functioning of the European Union, available online at http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:12012E/TXT, accessed November 12, 2015. For secondary law, see for example the Industrial Emissions Directive, the Environmental Impact Assessment Directive, Seveso Directive, and the Waste and Water Framework Directives.

prevention is that precaution implicitly rejects the risk by referring to its incalculability (what we do not know), while prevention supports the risk by referring to its calculability (what we know). In different terms, the prevention frame attempts to turn the unknown risk into a known risk.

Similarly, relational and normative strategies can also be modulated to either support or reject the risk object. What Boholm refers to as the faith strategy mobilizes relational keys to signal trust as a mechanism for coping with the risk. I will call that strategy *trust* from now on, as it is a more exact antonym to the inverse *mistrust* strategy, which does the opposite to discredit those running the risk or managing it. What Boholm identifies as an avoidance strategy implies an explicit negative normative judgment of the risk. It is inherently a bad thing regardless of what we know about it or who is doing it or managing it. The inverse of this might be called *acceptance,* implying a normative validation of the risk as something worth running because of the inherent value it embodies or the morally desirable state of affairs it can bring about. Thus, while both cognitive and relational strategies imply a normative judgment of the risk, they do this on the grounds of what we know about the risk or about the relevant actors. The normative strategies differ from the others by explicitly passing normative judgment on the risk *regardless* of its cognitive or relational dimensions. This difference matters and leads to another kind of framing strategies, as the analysis will show. Table 6-1 displays the typology of framing strategies for coping with unknown risks.

Table 6-1. Framing strategies for coping with unknown risks

	Normative	**Cognitive**	**Relational**
Support	*Acceptance*	*Prevention*	*Trust*
Reject	*Avoidance*	*Precaution*	*Mistrust*

Another way to understand the difference between the framing strategies is to consider to which aspect of the risk relationship they primarily refer. Normative framing strategies relate primarily to the objects at risk – they are normative claims about the values we attach to the threatened objects. Cognitive framing strategies, on the other hand, are primarily targeted at the causal link. Scientific evidence has a privileged position when it comes to crafting these types of framing strategies (Boholm & Corvellec 2011, p.181). They assume that the calculability (or incalculability) of the consequences of the risk object are the most salient feature of the risk relationship. On the basis of what we know, do not know or cannot know about the consequences and causal relationship, they pass judgment on the risk object. Finally, relational strategies target the actors or those carrying out or managing the risk relationship. They bring some characteristic of the relevant actors into focus as imparting crucial expectations about the risk relationship as a whole. It is also important to point out that the different parts of the risk relationship can be completely reconfigured in various framing strategies – one person's risk object may be another person's object at risk.[33] When analyzing how framing strategies address unknown risks, it is important to consider not

[33] Boholm & Corvellec (2011) provides an example of how a rail tunnel project can be seen as a risk to the groundwater and fertile geology of an area valued by farmers, and vice versa, how the groundwater and geology is seen as a risk to the successful completion of the tunnel. Likewise, the threat of 'dangerous dogs' can be configured in various ways to suggest that it is, for example, the responsibility of the owner, the kennels, or public officials to address.

only the ways that cognitive, normative and relational keys interact, in positive and negative modulations, but also the various ways that risk objects, objects at risk, and risk relationships are configured. This is because the way the risk relationship is configured, and the specific strategies used to communicate it, have direct implications for how the risk is governed (Corvellec 2010). This applies not only to the content of a frame, but also to how the frame is communicated.

6.3 Cognitive framing strategies: precaution

It seems natural to begin with cognitive framing strategies in order to demonstrate from the outset both their potential and limit when it comes to addressing risk. It is natural, also, because it is an intuitive, immediate reaction to risk: where better to start than to survey the situation and lay out what we know and do not know. Furthermore, being seen as those who know is often a powerful platform from where normative and relational expectations can be effectively signaled more broadly (Eyal 2013; Seabrooke 2014; Broome & Seabrooke 2015). However, the case studies show that the limits of cognitive framing strategies seem to be quickly reached in cases of disruptive innovation. It makes sense to begin with precaution strategies, as these tend to be used initially in the policy debates to make cognitive claims constructing the risks as seemingly insurmountable and therefore prime targets for heavy regulation.

When fracking and e-cigarettes first entered the EU policy arena (as detailed in the previous chapter), they were primarily framed through precaution strategies. After coding the interview data from the case studies according to the prevalence and use of the different framing strategies in interview statements, it is evident that environmental NGOs, public health NGOs, and the scientists that are allied to their causes are the

actors most frequently communicating precaution frames. This is unsurprising because these were the groups bringing the issues to the attention of regulators in the first instance, as witnessed in the previous chapter. What, exactly, was the content of the precaution frames?

6.3.1 The uncertainty of e-cigarette science

In the e-cigarettes case, the precaution frame can be summarized in a single interviewee statement from a cancer researcher: "There is absolutely no medical data to suggest the health benefits of e-cigarettes" (E11). Precaution arguments refer to the novelty of the e-cigarette and the lack of robust scientific data; this lack, of course, being a consequence of the novelty. The gold standard of scientific data in tobacco control and public health comes from long-term epidemiology studies (West & Brown 2014). By definition, we have to wait 30 years for these studies to appear, and there simply is no substitute for the data they provide (E3). Due to the time lag between cause and onset, epidemiology is the only way to quantify the risks of long-term use and identify chronic diseases. There is also the added caveat that we may never get exact results from these studies due to the continuing rapid changes in the e-cigarette market (E8). In other words, "we are chasing a moving target" (West & Brown 2014, p.442). Interviewees expressed frustration that the public and regulators wanted answers immediately about these inherently (at this point in time) unknowable risks (E3, E8, E19).

On the basis of this lack of epidemiology studies, precaution frames construct a number of tangible risks. Prime among these risks is their alleged attractiveness to young people, a risk that was repeatedly brought forward by precaution framers (E1a, E1b, E2, E3, E4, E5, E8). Because most tobacco users start when they are young, tobacco control focuses much attention on preventing youth smoking. Curbing youth

smoking was also one of the reasons given by the Commission when communicating the need for a revised TPD (European Commission 2012c). Several studies have noted the increasing use and awareness of e-cigarettes among youth (Durmowicz 2014; Grana et al. 2014), making it an easily available and convincing precaution frame. Specifically, children and young adults are positioned as the objects at risk in the risk relationship, lending it a compelling and emotional air. This fact was not lost on policy actors, who noted the normative power of arguments in favor of "saving the children" and also their use across different product categories from snus to flavored cigarettes (E12a, E12b). The effect of this framing is also to confer reputational risks on both experts and policymakers who "come out" in favor of e-cigarettes (E3) – all it would take is one headline reading "e-cigarettes are killing children" to put their careers in jeopardy (E5). The risk to children was seen one of the main reasons to support medicinal regulation, because if e-cigarettes were turned into pharmaceutical products, they would become both less appealing to children and harder to purchase.

In connection to the risk to children, a number of other societal or cultural risks were identified by interviewees: the gateway drug hypothesis, dual use, and the renormalization of smoking. The gateway drug hypothesis questions whether e-cigarettes might lure non-smokers into smoking conventional cigarettes. It is built on the common assumption in the "gateway theory" that soft drugs lead users to harder drugs and/or crime – a theory that is best understood as a constructed popular account intersecting academia, the media and popular culture (Bell & Keane 2014). The theory has been used to constitute and categorize different drugs in order to legitimize regulatory regimes, and its durability owes more to its ambiguity and simplicity than to any empirical validation (Sullum 2003). This ambiguity is precisely why it lends itself

well to a precaution framing. There is no conclusive evidence one way or the other, enabling the easy framing of the risk that e-cigarettes might indeed lead some people to smoke. Precaution frames are not hindered by a lack of evidence. The gateway drug theory operates only as a hypothesis in the e-cigarette debate, but one that constructs a risk. Similarly, the benefits of e-cigarettes, and especially their potential as smoking cessation devices, are also treated as hypotheses in precaution frames: "it is an interesting hypothesis, but there is no data" (E3). Juxtaposing these hypotheses lets precaution framers argue that any benefit from e-cigarettes can easily be offset by harm.

The harm side of the equation is bolstered by the dual use and renormalization risks. The notion of dual use argues that rather than being used as cessation devices, e-cigarettes may facilitate continued addiction by allowing smokers access to nicotine in settings where it might be banned or otherwise not tolerated, for example in public buildings, cars, trucks, airplanes, bars, or restaurants. The dual use argument questions how easily we can separate e-cigarette users from conventional smokers, thereby also functioning as a mistrust framing of e-cigarette users. In addition, dual use casts doubt on surveys that show potential benefits of e-cigarettes, by introducing it as an obfuscating variable that was not accounted for (E8). Geographical and cultural context was also used as a way to discredit these surveys, arguing for example that snus may work in Sweden as a cessation route, but in other countries it could be a gateway drug: Swedish use is culturally specific and not directly translatable to other settings (E16a, E16b). Like the dual use argument, the issue of renormalization also casts doubt on the proposed benefits of e-cigarettes, but in a different way. The renormalization argument proposes that e-cigarettes present a cultural risk by making smoking seem normal again (E1a, E1b). This happens through increased visibility of smoking-like behavior through

advertisements and vaping in places you cannot smoke, and through the previously discussed mechanisms (youth appeal, gateway drugs, and dual use). Combined, there is a risk that these things lead to increased smoking rates and increased cultural tolerance of smoking. What is at risk in this relationship is then the past many years of gains in tobacco control which have denormalized smoking. The renormalization argument is therefore directed at public officials and tobacco control professionals as a risk that devalues and undermines their work and previous efforts. It creates a link between precaution and avoidance that I will investigate further in the next chapter.

In lieu of scientific certainty on these social and cultural risks, much discussion resorted to questions concerning nicotine pharmacology and toxicity tests of e-cigarettes, which does not require long-term studies. In the precaution framing, nicotine is seen as a problem in its own right (E1a, E1b, E2, E3). A claim that frequently recurred was that "nicotine is a toxic and addictive substance", which follows the WHO line on nicotine (World Health Organization 2014). According to the WHO, nicotine addiction is classified as a disease (World Health Organization n.d.). Precautionary frames in support of this referred to incidences of poisoning and death due to imbibing or spilling nicotine solutions, especially in children (E2). In addition to nicotine, there was also frequent reference to "vast numbers of chemicals in e-cigarettes" which made "strict regulation absolutely necessary" (E6), according to the Commission. In connection to nicotine toxicity, questions of product quality were also raised very often (E10a, E10b). E-cigarettes were framed as dubious Chinese products with quality issues leading to unreliable dosing of nicotine and other chemicals and electrical failures –

something which "pharmacovigiliance"[34] under medicinal regulation would set right (E1a, E1b). As we shall see in the *Prevention* section, much of the cognitive counter-framing pounced on this issue of nicotine toxicity and addiction, perhaps because it was an area where scientific claims and counter-claims were easier to make than in the inherently uncertain area of the long-term social and cultural risks.

In sum, precaution strategies were mostly deployed by the extant, mainstream tobacco control community. Interestingly, in spite of the lack of medical data and studies on e-cigarettes, this did not initially prove an obstacle to the establishment of jurisdictional boundaries around the e-cigarette issue as something to be treated by medical and public health professionals. They achieved this by using uncertainty strategically to connect e-cigarettes to a number of well-known risks in tobacco and drug control through hypothesized causal relationships to youth appeal, dual use, harder drugs, and renormalization. The disruption was clearly made sense of in terms drawn from their institutional environment.

6.3.2 Fracking as a novel risk

Moving on to the fracking study, we witness the same logic being used in precaution frames to construct the risk as "impossible to make safe" (F1). The framing was especially pursued by environmental NGOs to a much higher degree than other policy actors. Central to the precaution framing of fracking was the asserted novelty of the technology. This constitutes a significant marking of disruptiveness (Vollmer 2013), which the NGOs filled with their own interpretation. They distinguish between hydraulic fracturing (which has been done for a long time) and high volume hydraulic

[34] Pharmacovigilance refers to the regulatory regimes that ascertain the effects and safety of pharmaceuticals while continually monitoring their use.

fracturing (HVHF) (which is a novel process). Oil and gas wells have been stimulated with water under high pressure since at least the 1940s (King 2012). What sets HVHF apart is the intensity of the process and its cumulative impact over time: HVHF uses 100 to 200 times as much water and takes place over a longer duration (F1). When targeting shale layers, it requires the combination of fracturing with directional (horizontal) drilling through the shale formations and the use of chemical additives and sand allowing the fractures to form and stay open. It is specifically the combination of these three things on which the novelty argument is built. Furthermore, shale gas developments require more wells and therefore more drilling and land use compared to conventional gas developments (F7). Shale gas wells are only expected to produce economically for 4-5 years instead of 20-30 for conventional. For the NGOs and for DG Environment, these factors led them to treat HVHF as a novel and more intense industrial process, and a process with which Europe has very little experience (F1, F4). DG Environment's Impact Assessment differentiates between conventional and unconventional developments in this manner, allowing them to argue for gaps in legislation that do not address this cumulative impact over time (European Commission 2014c). The arguments that HVHF is novel, intense and leads to unknown cumulative impacts over time are central elements in the precaution framing.

As a result of this increased intensity and accumulation of impact, a number of concrete risks are defined. The most widely publicized and contentious one is the risk to groundwater. There are numerous pathways by which the fracturing process can lead to groundwater contamination, for example: poor well design or failure, leaks to aquifers during the fracturing process, surface-level spills of chemicals return fluids, or inadequate transport or treatment of fluids. Rather than go through each of these

pathways in detail, it is sufficient to say that the precaution framing emphasizes how difficult it is not only for regulation to mitigate the risk of each of these pathways, but also how nearly impossible it will be to monitor industry compliance and performance (F18) – "the best legislation in the world doesn't matter if you don't back it up with the best implementation and monitoring" (F1). On the issue of monitoring, the precaution framing also brings up the limited amount of staff (and their limited expertise) that would be expected to carry out this task (F18). These problems are especially exacerbated if the industry develops to a point where we have thousands of wells in Europe – the NGOs make the point that we cannot even get good data on the single well in the United Kingdom (F18). By the same logic, this framing also devalues the American studies arguing that the risks are under control. The NGOs question the quality of data on two grounds: obvious conflicts of interest due to industry control of the data and the fact that 75% of fracking studies have only been published in the last two years, meaning they will not reflect long-term impacts (F1). The chemical makeup of the fracturing fluid is also frequently protected as a trade secret, although more and more companies are starting to divulge and share information.[35] In spite of these limits to data quality, the precaution framing refers to the "mountain of evidence" that indicates harmful impacts, with 72% of studies linking to water contamination and 80% to air (F1).

A few of these pathways are worth exploring in more detail due to their connection to other framing strategies. Fugitive methane emissions are a central issue because the extent of the problem has a direct bearing on the global warming potential (GWP) of fracking. Proponents argue that a switch from coal to gas would be a cost-

[35] See for example FracFocus.org and NGSFacts.org, two industry initiatives to spur voluntary disclosure of well information.

effective way of meeting the challenges of global warming because gas emits half the CO_2 of coal. These benefits are foregone, however, if fugitive methane emissions from anywhere in the gas supply chain escape into the atmosphere. Because methane is a much stronger greenhouse gas than CO_2, it would not take a very high proportion of such emissions to offset any gains. The precaution framing refers especially to studies by Robert Howarth (Howarth et al. 2011; Howarth 2014) to back up this claim and to essentially argue that the "climate benefits of gas are unproven" (F18). Wastewater treatment is another issue that also received much attention (F7). After fracturing the well, "flowback water" returns to the surface and gets collected before the well starts producing. Flowback water contains not only sand and chemicals used in the fracturing fluid, but also radioactive compounds from the fractured rock formations. Operations in the U.S. have developed three different ways to treat this water: open tailing ponds (where polluting elements evaporate and dissipate), sending it to treatment plants (all of which are unequipped to treat it), or reinjection into old wells (which leads to seismic events and runs the risk of leaking into aquifers if casings are breached). All three ways are deemed inadequate. The collection of all these risks leads the NGOs to compare regulation of fracking to "treating cancer with a headache pill" (F1).

It is interesting to note that precaution frames were used not only to communicate environmental risk, but also to "debunk" economic arguments. The NGOs found that environmental arguments did not have enough traction with the Commission during a time of economic crisis, so they "switched arguments to the economic realm while still holding on to the environmental arguments" (F1). This was a strategy to counter the economic counter-framing coming from the pro-fracking actors, which I detail in the next section. The precaution arguments challenged the assumptions being

made by economic studies as to the employment and growth potential of developing a European fracking industry. Here the focus was both on challenging the narrative of an American success story and the possibilities of replicating it in Europe.

Concerning American success, the precaution frame argues that the gas price is artificially low and only benefiting industry, not consumers (F1). When it comes to industry benefits, those are limited as well. They are mostly restricted to the chemical and fertilizer industries – in less energy intensive industries there are almost no competitive advantages (F1). Concerning European replication of that "success", the NGOs bring attention to the high price of water in Europe, the limited oil and gas expertise and infrastructure, the high population density, and the differences in geology and licensing schemes, among other things (F1). They also point to the initially very high expectations that have turned into disappointments: companies have found it difficult to set up profitable operations and have started to give up on the continent, and the International Energy Agency (IEA) keeps decreasing their estimates of technically recoverable reserves of shale gas in Europe (F18). Even if all things go well, the IEA's "Golden Rules Scenario" for European shale gas development is only projected to offset a modest amount of imports (International Energy Agency 2012, p.129). Taken as a whole, then, the precaution framing of fracking argues that there are too many unknowns, too many things that can go wrong, and even if we get them right, it is unlikely that it will matter much in economic terms.

Precaution strategies in general emphasize uncertainty to play up the possible risks and dangers that disruptions can pose. First impressions tend to come in the form of precaution – we see this in both case studies. When fracking and e-cigarettes were brought to the attention of European policymakers, it was through precaution frames

deployed by NGO campaigners. In both case studies, the precaution frames do the work of positioning the disruption as a risk that should be controlled and addressed by the NGOs in partnership with the regulators.

6.4 Cognitive framing strategies: prevention

In direct opposition to the precaution strategies, prevention strategies emphasize the sufficient extent of current knowledge that can be brought to bear on the risk in order to make it manageable. As the policy debate unfolded and started to include more actors, proponents of the risk objects used prevention frames to pose cognitive challenges to the precaution narrative. They did so by emphasizing not the uncertainty of the risk relationship, but those parts of it that we already understand well and the options we have for mitigating adverse outcomes.

6.4.1 The certainty of e-cigarette science

In the e-cigarette case, the prevention argument can be summarized in a statement from a representative of the Electronic Cigarette Industry Trade Association (ECITA): "We just want the institutions to listen to the science!" (E7). The prevention frame presents a picture of scientific certainty on a few key issues, but chief among them is the widely held scientific opinion that e-cigarettes are an order of magnitude less harmful than conventional cigarettes (E5, E7, E10a, E10b, E15, E17, E18). The current best estimate is around 95% less harmful (McNeill et al. 2015), a figure which was also quoted in interviews (E9). Lacking epidemiology studies, this figure can only be established by a toxicity analysis of the chemicals created by vaporization of the nicotine solution in e-cigarettes. This figure builds on a direct comparison between the levels of carcinogens and toxic elements in conventional cigarettes and e-cigarettes.

The prevention framing also disputes the claims about the toxicity of nicotine itself. Some interviewees compared it to stimulants like caffeine (E6), for example by saying "they are only one hydrogen apart" (E17). Preventive arguments drew on both scientific evidence, anecdotes and common sense to frame nicotine as a harmless stimulant. They would refer to scientific studies that questioned its addictiveness, the exact lethal dose, and its link to cancer (Mayer 2013; Fagerström 2014), much of which had been prepared in connection with the Swedish snus policy debate (ENVIRON International Corporation 2010; Fagerström & Schildt 2003). These claims were especially associated with accusations of fearmongering (E6) by the precaution framers who warned of child poisoning and death from ingesting or spilling nicotine cartridges, creating a link between prevention and mistrust frames. To challenge these claims, the e-cigarette industry focused much effort on developing quality standards and good manufacturing practices (E7). They also countered by comparing the risk of nicotine poisoning to poisoning from standard household products "that you can find under any kitchen sink" (E7). Responding to the growing number of nicotine poisoning incidents, they would compare this number to the much more frequent occurrence of poisoning by toothpaste or prescription drugs, in particular the smoking-cessation drug Champix[36] (E7, E17, E18). These claims were especially used to target the proposed limits on nicotine concentration and cartridge size, both of which were seen as arbitrary and with no basis in science (E7, E15) (the precaution framers countered that this limit was based on NRT testing [E3]).

[36] Champix/Chantix (varenicline) is a popular smoking-cessation drug that has gotten much media attention due to accusations of a range of very severe side effects, among them suicide, depression and anti-social behavior (see for example: http://www.huffingtonpost.com/2011/11/04/chantix-suicide-risk-smoking-cessation_n_1076575.html, accessed November 16, 2015).

A typical common sense argument was to compare e-cigarettes with NRT products (E18), which contain higher concentrations of nicotine, but are not seen as particularly risky (E15). Nor are they very effective cessation tools: many interviewees cited the extremely low success rates (less than 10%) of NRT products and their loss of market share to e-cigarettes (E17, E18). This was primarily attributed to their lacking appeal compared to e-cigarettes (E13), in particular the lacking "behavioral aspects" (E7).[37] Concerning anecdotal evidence, one interviewee even ingested 100 mg of nicotine solution himself in order to disprove the accepted lethal dose of 40-60 mg (E18).[38] A key purpose of the focus on nicotine was also to contest the medicinal definition of nicotine implied by the pharmaceutical products regulation (E17). Drawing on some of the above arguments, the Tobacco Vapor Electronic Cigarette Association (TVECA) had succeeded in challenging the medicinal definition in courts in the U.S. and the Netherlands by disproving the presence of pharmacological effects, [39] providing an alternative definition of nicotine as stimulant. This was an important element in challenging the Commission's proposal to regulate e-cigarettes as pharmaceutical products.

In building a narrative of scientific support, the prevention frame draws not only on select scientific studies, but also on lay expertise. What motivated many proponents to support e-cigarettes in the policy debate was their exposure to personal accounts of the efficacy of e-cigarettes (E6, E7, E18). Many vapers are convinced that e-cigarettes have saved their life, and they become extremely passionate "apostles of the product" (E5). Proponents relied on this lay expertise to challenge the precaution framing, the

[37] In other words, e-cigarettes mimic the social and behavioural dimensions of conventional smoking.
[38] He promptly threw up. The vomit reflex prevents nicotine poisoning due to ingestion.
[39] For something to be considered a medicine, it must permanently cure, stop or mitigate a disease. According to this argument, nicotine does not do any of this.

argument being that if people are convinced that they work, why should we worry about what the scientists say? In contrast, the precaution frame implies a public deficit of science understanding: "We must be honest toward the smokers" (E11). The public is not seen as holding valid knowledge on e-cigarettes. Rather, from their positions as experts and scientists, the tobacco control professionals have an obligation to warn the public about their risky choices.

In the realm of public health, two sets of studies were particularly brought forward: survey evidence of public health benefits and parallels to the use of snus in Sweden. Most of the survey studies came from the UK, where the market had been growing very quickly and much data became available. Studies from the NGO Action on Smoking and Health and Robert West's Smoking Toolkit Survey indicated their potential as cessation tools and their low appeal to children (E7, E12a). The Swedish experience with snus was also seen as a parallel to what might be expected of wider e-cigarette uptake: Sweden has comparable rates of tobacco use to the rest of Europe, but much lower rates of cancer (E12b, E16a, E16b). This is because snus accounts for a large proportion of tobacco usage, offsetting much of the harm from conventional smoking. However, as mentioned in the precaution framing, these studies were often disputed by opposed tobacco controllers on various grounds.

In reviewing these claims about the safety of e-cigarettes, it becomes apparent that they do not account for the social dimensions that the precaution framing warns about (barring the Swedish snus studies) or the risks of long-term use. Although there is consensus on the toxicity issue in both camps (E1a, E1b, E3, E19), the framings differ by how much importance they accord to these unknowns. To defend their position, those arguing in preventive terms have to resort to a normative argument: how can we

justify banning or severely restricting e-cigarettes when much more harmful cigarettes are already widely available? The two framings also differ in how they treat emotionality: emotional appeals by vapers are seen by the prevention framing as testament to the efficacy and social appeal of the product, while the precaution argument views these as irrational outbursts. This is one example of where cognitive framings reach their limit and discussion proceeds to the normative and relational assumptions that are always under the surface of any scientific discussion. In contrast to the e-cigarette debate, prevention frames in the fracking debate did not see the public as holding valid knowledge on the issue.

6.4.2 Fracking as a well-known risk

In the fracking study, prevention frames were especially mobilized by the industry and the academic experts that agreed with them. These frames found resonance within DG Energy and DG Enterprise, but less so within DG Environment. Prevention arguments claimed that the risks of fracking were exaggerated by the NGOs for political purposes and sensationalized towards the public via *Gasland* and the media in general. There is therefore a clear link between cognitive and relational frames in this case as well. To prove that risks were well understood and easily mitigated, they opposed the framing of HVHF as anything particularly innovative or new. Actually, the argument went, fracking has been going on for a long time (F3). The industry does not recognize that there is a significant difference between fracking and HVHF. That is to say, while they recognize that fracking shale layers involves a higher level of activity, they do not agree that this implies a significantly different risk profile than fracking in conventional operations.

In connection to this point, they also disputed whether there even was a difference between conventional and unconventional sources (F17): they are the exact same oil and gas products and there are only minor differences in how they are extracted. Many of the risks that are thought to be specific to fracking also apply to conventional onshore operations and other types of energy production. For example, any gas well has to be drilled through the water table and protected by several layers of steel and cement casing. One interviewee made the point that geothermal wells require much more intensive fracturing processes than shale gas wells, because you have to fracture granite, which is a much denser rock than shale – in addition, the flowback water is more radioactive (F15). Yet, there is no public or media attention on geothermal fracturing. In the prevention framing, it is common to decry the absence of "clarity of thought" (F15) and to complain about "misinformation and lack of information" (F5) or the emotionality of the debate (F3) – something to be fixed by "injecting science" (F3), "acting as mythbusters" and "bringing expertise to the debate" (F5). There is a clear assumption in this framing of a deficit model of public understanding of science. The oil and gas industry positioned themselves as those with the most credible and applicable knowledge of the technology due to their long history and control of data. Some in the industry saw their failure to control the debate as a problem of educating the public and policymakers (F5, F17).

Drawing on this expertise, the prevention framing presented a number of technical answers to the threats identified in the precaution framing. To give a sampling: well casings are generally made with several layers of reinforcement to protect aquifers (F13); reinjection can be avoided in areas with seismic risk (F2); closed vessels can be used to collect flowback water and fugitive methane emissions (F12); and micro-

seismic monitoring gives a real-time picture of fractures as they develop in shale layers, eliminating any risk that they travel to aquifers or to fault lines (F12). Furthermore, fractures only travel a maximum of 350 meters in a vertical direction, meaning that it is extremely implausible that any should be able to reach aquifers in any case, given that European shale layers are typically located 2-3 kilometers below the groundwater (F13, F14). Responding to the accusation that fracking uses too much water, the prevention framing puts things into perspective: drilling 50,000 wells would need about 1 billion cubic meters (bcm) of water, which is a lot, but only a drop in the ocean compared to the annual water use of France, for example, at 33 bcm per year (F5). When it comes to methane emissions, the industry argued that they have no incentive to allow these emissions as it means less gas for them to sell (F3). Academic experts also viewed Howarth's studies as outliers compared to other studies from the MIT and the Environmental Protection Agency in the U.S. (F13). The purpose of these arguments is clear: we understand the risks and we have the answers – there is nothing to worry about. In connection to these arguments, interviewees often pointed out that the track record and empirical evidence was in their favor, creating a seamless segue to a trust framing. For example, no one has complained about any problems with the 19,000 conventional wells drilled in Poland during the Soviet era (F11) or with the 6,000 wells drilled in the Netherlands (F12).

The International Association of Oil and Gas Producers (IOGP) is a key organization through which the industry agrees on a common line and communicates to the policymakers. For the American companies, this is especially true, as it can be sensitive for them to be seen lobbying too vigorously in the EU (F6). In communicating the benefits of shale gas to the EU, the IOGP heavily emphasized the economic aspects,

which they estimated through macroeconomic studies carried out by third-party consultants (F5). These studies found traction within certain parts of the Commission, where promises of job and growth creation resonated with a political hunger for guiding the EU out of the difficult post-crisis years of economic stagnation. However, macroeconomic projections rely on a broad array of vague assumptions and methodologies that are easily challenged: while the IOGP estimated 1.3 million jobs created from around 50,000 wells (Pöyry & Cambridge Econometrics 2013), DG Environment's Impact Assessment estimated 350,000 (European Commission 2014c, p.65), but with the caveat that only very few of these would be high-quality, long-term jobs (F4). For this reason, and because initial expectations for an American style shale gas bonanza did not match reality, the economic side of the shale gas question paled in comparison to the environmental one (F17).

Still, this did not deter DG Enterprise from complaining that the Impact Assessment understated the economic dimension (F9), a position shared by several other Commission personnel (F7, F10). This indicates that the framing contest also took place within the Commission itself, among its different DGs. In general, however, it can be concluded that the Commission came to think of fracking in terms of preventive framing. Concerning the environmental risks and mitigation measures mentioned earlier, interviewees from the Commission agreed that the science was well understood and the risks well identified (F4, F7, F8, F9, F10). Although treatment of the issue in the first place seems to be due to the strength of the initial precaution frames, preventive counter-framing did much to decrease the scale of perceived regulatory requirements, also within DG Environment who even discussed adopting a "wait-and-see approach" (F4).

The most common complaint from Commission staff was the politicization or emotionality of the debate: how it forced everything into a black and white, for and against framework (F4). This led to frequent calls for more facts and a more balanced, technical, objective and nuanced debate (F4, F8, F10). Lay expertise was seen as a part of this problem: "I have never witnessed a policy area where the discrepancy between public perception of risks and expert perception of risks was larger than in fracking" (F7). Things that "citizen experts" (retired engineers, for example) saw as a big problem, such as the underground contamination of groundwater, were not seen as problems by scientists and petroleum engineers, who rather emphasized the aboveground handling of wastewater as the biggest concern (F7). The interviews hence indicate frame coherence between the industry, academics and Commission staff on the technical risks and mitigation strategies of fracking. However, this technical coherence left the question of public acceptance completely unaddressed.

Prevention frames, in general, tend to be deployed by the policy actors that defend the merits of the innovation. As such, they are often responding to the charges levelled in the initial stage by precaution frames. A common strategy seems to be to shift the basis of comparison on which innovations are judged: rather than compare vaping to not vaping, vaping is compared to conventional smoking – rather than compare fracking to not fracking, fracking is compared to conventional gas operations. Precaution is a language of absolutes; prevention of relatives. But neither the absolutes nor the relatives were able to dominate the cognitive keying of the policy debate. There is, however, an interesting discrepancy in how the framings treated public sentiment in the case studies, which I discuss below.

6.5 Conclusion: the limits of expertise

To what extent did preventive counter-framing succeed in overturning the power of first impressions? For the fracking case, the answer is no: preventive counter-frames succeeded in convincing key actors in the Commission to scale back regulatory ambition, but the frames were narrowly targeted at technical and scientific experts and not at the "emotional", "irrational" public who remain unconvinced of the merits of fracking to this day.[40] For the e-cigarette case, the answer is yes: preventive counter-frames were both narrowly technical *and* broadly inclusive – they drew on both scientific and lay expertise to gain enough momentum in the Parliament to contest pharmaceutical regulation. The frames that assume a public deficit model of science understanding are inverted in the two cases: in the e-cigarette case it is the precaution frame, in the fracking case it is the prevention frame. These are also the framings that won support within the Commission but not with the public. The lack of public support became an obstacle for these strategies, more so in the case of e-cigarettes as this was dealt with in the Parliament. A key ingredient in the treatment of risk objects hence seems to be public support, and this is not won through narrow, technical arguments. However, too much public support runs the risk of populism, and both case studies suggest that the Commission is reluctant to engage with or take seriously framings that are seen as too emotional.

In adhering to their narrowly, technical understanding of risk, the Commission may be doing themselves a disservice. Eyal (2013, pp.875–876) has suggested that expertise is powerful when it is generous, that is, when it "can be grafted onto what others are doing, thus linking them to the network and eliciting their cooperation". One

[40] This is true within most EU member states, at least.

way of linking broader social groups to a network of expertise is by drawing on lay or citizen experts, presenting anecdotes and personal accounts as valid scientific testimony, and seeing emotionality not as problematic but as emblematic of the importance of getting things right. This was the approach taken by preventive framers in the e-cigarette case, but not in fracking. The precaution frame in fracking, which enjoyed public support, did not make any links to the public on a cognitive basis however. In fact, both sides of the debate in the fracking case assumed a public deficit of science understanding: the IOGP thinks that more knowledge will convince people that fracking is acceptable, while Friends of the Earth Europe (FoEE) thinks that more knowledge will convince people that fracking is unacceptable. Both sides are wrong because the deficit model is wrong, or rather, it is insufficient. Cognitive elements are only one input to the framing contest. We have to look at normative and relational framings of the risk objects to understand how broader social support can also be secured, or hampered, by the different framing strategies – and how cognitive frames indeed seem subservient to (or at least dependent on), normative and relational ones. The patterns of normative and relational signaling indicate the importance of considering the deep structure of the policy debate: all those things going on underneath the surface of ostensibly technical and rational negotiations.

Chapter 7

The deep structure of policy debates: normative and relational framing strategies

7.1 Introduction

The discussion in the previous chapter concerning cognitive framing strategies underscored a basic fact of policy debates: science is seldom an adequate response to public worries. Although their reasons differ, all the critiques of technical risk analysis (TRA) that I presented in that chapter agree on this point. Even the popular press has brought attention to this issue: a recent article in National Geographic looked more closely at the wave of science skepticism sweeping across the United States currently, from climate change deniers to the anti-vaccine movement (Achenbach 2015). Studies in the psychometric school provide some answers as to where this skepticism is coming from. For example, works on cultural cognition provide experimental evidence to suggest that people conform their beliefs about disputed matters of fact to values that define their cultural identities (Dan M. Kahan et al. 2011). Other recent psychological evidence suggests that when scientific knowledge becomes internalized in people, it is just one more set of beliefs that sits alongside and competes with previously held notions that have been learned earlier in life (Shtulman & Valcarcel 2012). These studies are upending prevailing notions about science literacy and the public deficit

model. While it might be expected that greater science literacy about climate change, for example, would diminish the extent of controversy by aligning opinions with scientific consensus, the opposite was actually found (Kahan et al. 2012; Dan M Kahan et al. 2011). The public deficit model would expect the public to fall into line with expert consensus once they become better informed. Instead, as people learn more, they seem to polarize further.

The current chapter takes up the task of investigating this polarization. I argue that cognitive keys are always signaled within a context that is already structured by normative and relational expectations. We can think about cognitive framing strategies as operating on the surface of a deeper-lying structure to the debate. If this makes cognitive, normative and relational keys sound too disconnected from each other, that is not the point I wish to make – rather, all framing strategies by necessity incorporate elements of all three types of key simultaneously (Vollmer 2013, pp.55–6). But when we shift perspectives to those strategies that emphasize norms and relations, it suddenly becomes clear why a purely technical consensus is such a rare occurrence: agreement and coherence must be sought not only on the surface, but also between the deeper connections. To understand how this works in the case studies, this chapter dives into the deep end.

7.2 Normative framing strategies: avoidance

Cognitive framing strategies failed to establish a scientific consensus on how to understand the risk objects. This is because they were influenced by underlying normative and relational tensions, which precluded any form of agreement being reached. In the policy debate, discussion proceeds from cognitive to normative terms

when participants begin to deal with claims about what is inherently good or bad about the innovations, arguing that the risks should be either avoided or accepted on that basis alone. The frames focus on the objects at risk and the ways they stand to harm or benefit from the risk. Avoidance strategies reject the risk object on normative grounds. In general, the actors that tended to make use of precaution frames are also the ones relying most heavily on avoidance frames.

7.2.1 E-cigarettes: abstinence

In the e-cigarettes case, the debate was driven by two opposed norms of tobacco control: abstinence versus harm reduction. Abstinence, or smoking cessation, is the mainstream norm in tobacco control (Fairchild et al. 2014) and the central element in avoidance frames. The abstinence norm states that the goals of tobacco control are best pursued by advocating for complete smoking cessation. On the level of the individual, this is taken to mean that the only legitimate quitting options are going cold turkey or using NRT products to phase out the addiction. On the societal level, this is interpreted as working towards the "tobacco endgame" (Thomson et al. 2012; Malone et al. 2014): the complete elimination of tobacco and nicotine addiction. Conversely, the harm reduction norm, which originates in needle-exchange programs to reduce the risk factors for HIV/AIDS and hepatitis among injecting drug users, states that beneficial public health outcomes may be better facilitated by measures aimed at mitigating the negative consequences of continued drug use instead of outright restricting, eliminating or banning certain drugs (Phillips 2009). According to this norm, we should take a more pragmatic approach and tolerate drug use as long as we take steps to make it less harmful to both the individual and society.

Abstinence has been the logic behind the tobacco control measures in Western countries in recent years: raising the price of cigarettes to make it more expensive to smoke, warning labels making it less desirable, smoking bans in bars, restaurants and public spaces making it a more deviant and socially unacceptable behavior.[41] The exact elements of endgame strategies and the criteria of success are in dispute, but endgame advocates share the vision of a world where tobacco is no longer "Public Health Enemy #1" (Warner 2013, p.i3). This vision is institutionally enshrined in the WHO's Framework Convention on Tobacco Control (FCTC). Article 5.2(b) of the FCTC commits parties to reducing not only tobacco use, but also "reducing nicotine addiction independently from its source" (World Health Organization 2014, p.10). Article 5.3 of the FCTC, which is meant to insulate tobacco control policy from industry influence, has almost made it a law that public health officials cannot associate with the tobacco industry – to the point that they sometimes refuse to accept business cards from tobacco industry representatives (E12a). Furthermore, Article 14 states that quitting methods must have a sound basis in science, which many took to preclude e-cigarettes based on the current level of scientific knowledge (E3). Therefore, the recreational use of nicotine is not a public health option under the treaty, and there is little to no role for the tobacco or e-cigarette industry in the endgame world.

To support the abstinence and endgame ideals, nicotine addiction has been classified as a disease by the WHO. According to the International Classification of Diseases, smokers suffer from "tobacco dependence syndrome" (World Health Organization n.d.). This also explains why the precaution frames place such heavy emphasis on framing nicotine as a toxic and addictive substance, as it coheres better

[41] The last point refers to the "denormalization" of smoking, which is threatened by the "renormalization" of seeing e-cigarettes smoked more widely in public places.

with a framing of nicotine addiction as disease. When these frames are put together, smokers are constructed as objects at risk that are sick, helpless and stigmatized. The risk relationship places authority in tobacco control, public health, and medicine as the appropriate institutions to treat the risk by curing the disease and eliminating addiction in the population. Pharmaceutical regulation of e-cigarettes is hence the preferred way to approach the risk object. E-cigarettes as recreational devices are rejected and reconstructed as a new type of NRT product that can only be used as a quitting aid.

The FCTC is of central importance to tobacco control organizations (E1a, E1b, E3). Many of them describe their organizational mandate as the full implementation of the FCTC (E1b). While they are free to set their own policy priorities, public health and tobacco control NGOs take great care to align their standpoints with those of the WHO. The legitimacy of the WHO has been established through the United Nations system and international treaties such as the FCTC. Lacking such formal ties, the NGOs are left with appealing to the scientific expertise of the WHO as the basis of their own legitimacy. All the NGOs stressed the importance of being evidence-based and scientific (E1a, E1b, E3, E8, E11). However, this arrangement also ended up making it difficult for the NGOs to act forcefully in the policy debate (E1a, E1b, E3, E19). The scientific uncertainty, especially the lack of epidemiology studies, made it hard for the NGOs to come out strongly either in support or rejection of e-cigarettes. At the beginning of the policy debate, none of them chose to focus much on e-cigarettes because of this, but also because no one expected it to become such a contentious issue (E1a, E1b, E3). As policymakers started to increasingly demand an official position from the tobacco control organizations, it became impossible to leave the topic untreated or bring attention back to their prioritized issues in the TPD (warning labels,

illicit trade, and flavors) (E1a). Lacking scientific evidence, most referred to the FCTC and the abstinence norm to argue for pharmaceutical regulation (E1a, E1b, E11), especially motivated by a wish to avoid the risk of renormalization, which "could set us back to square one" (E3). However, a small but growing and vocal harm reduction movement within public health even precluded some organizations from reaching normative consensus (E19). All of this left the tobacco control organizations weak and divided in the debate. While the abstinence norm is very strongly institutionalized within tobacco control, the lack of data on e-cigarettes meant that the policy actors meant to be defending this norm found it difficult to organize on the issue and were more interested in other aspects of the TPD anyway.

7.2.2 Fracking: avoiding fossil fuel lock-in

In the fracking case, we also see avoidance frames from the NGOs in particular that rejected the risk object. These frames primarily place the global environment and climate as the objects at risk to argue for normative rejection of fracking. The argument is that climate change is such a severe challenge that we must start to address by all means possible as soon as possible. This is neither the time nor place for fracking – "we need a complete and urgent transition to a low carbon economy" (F1). The problem with fracking, in this frame, is that not only does it exacerbate the problem of climate change through fugitive methane emissions and energy-intensive extraction processes, it also risks locking us in to a new fossil fuel cycle (F1, F18). This lock-in is both economic and political. Economically, increasing the share of gas in the energy mix requires much long-term investment in new gas-fired power plants that must operate for 20-30 years to be considered profitable and are likely to be renewed several times after that. Politically, the risk is that an abundance of shale gas will make the transition to a

low carbon economy seem less urgent and less necessary. Essentially, a lock-in would imply a de facto normative endorsement of a fossil fuel for the foreseeable future, which the NGOs believe it is paramount to avoid. Avoidance frames therefore focus on dispelling the "myths of clean gas or gas as a bridge fuel" (F1) to keep policymakers focused on the more desirable goals of renewable energy, energy efficiency, and restoring the emissions trading scheme: "the only thing we should be doing when it comes to gas is cutting demand" (F18). The NGOs' vision of a desirable energy future is small-scale, local renewable production, energy efficiency, using less energy and using it smartly (F1). Another problem with the coal-to-gas transition is the idea that coal would just decrease in price and flood the world markets, making other countries choose to burn more, cheaper coal (F4).

Where the NGOs in the e-cigarette case derive their mandate from the FCTC, the anti-fracking NGOs believe their legitimacy derives from the climate change problem (F1). They operate in the public interest and not according to any narrow, environmental agenda. They see themselves as having a much stronger mandate for their positions than the industry does, frequently pointing out the lack of the industry's "social license to operate" as testimony to the public resonance of their own work (F1). On this basis, they also challenge the idea that the Commission has any mandate for its work on fracking: its own public consultations show that the public does not want fossil fuel development in the EU (F1). The avoidance framers also point out that votes in the Parliament and its committees are becoming more and more opposed to fracking (F1). Within DG Environment, there are some that agree that the public does not stand to gain much by supporting fossil fuels under current arrangements (F4), whereas the economic incentives offered in the U.S. by firms purchasing mineral rights from landowners has

done much to build public acceptance across the Atlantic. According to the avoidance frame, strict or binding regulation might have had the potential to build public acceptance by at least showing the public that their worries were being heard and addressed (F4, F12). Binding regulation would have "sent a signal" (F1) and built trust in the Commission and the industry while providing better data due to monitoring.

When we look at the normative backbone of the environmental NGOs in the fracking case and the tobacco controllers in the e-cigarette case, it becomes clear that the disruptions are direct violations of their beliefs, values and mandates. As such, it is almost impossible to imagine that any form of cognitive re-keying (that is, new information that changes what we know about the risks of fracking or e-cigarettes) can do anything to change their minds about the disruptions. This is why the deep structure of the policy debate matters.

7.3 Normative framing strategies: acceptance

Acceptance frames support prevention frames: they normatively support the cognitive arguments that the risk is well understood and can be controlled. They do this by primarily focusing on the positive outcomes that the risk objects may entail. These frames were especially prevalent among fracking proponents in discussions on public acceptance, both within the industry and in policy circles. In the e-cigarettes case, they were less prevalent, but mostly put forward by the e-cigarette industry.

7.3.1 E-cigarettes: harm reduction

As mentioned in the avoidance section, there is a normative tension between the abstinence and harm reduction norms in tobacco control. The abstinence norm is beginning to encounter increasing resistance for a number of reasons. For one, gains in

tobacco control seem to be getting increasingly difficult to realize. While smoking rates decreased rapidly from the 1960s to the 1990s, gains have become increasingly harder to realize since then.[42] There is a widely held belief that it is exceedingly difficult for traditional tobacco control measures to decrease smoking prevalence below 20% of the population (E11). A harm reduction approach may be better suited to reach these smokers. It is gaining momentum among certain public health professionals working on tobacco control, particularly in the UK and in the Nordic countries (Britton 2003; Phillips 2009; Hajek et al. 2014). However, the norm of harm reduction has not enjoyed the same influence on tobacco control as it has on injection drugs, where it was first proposed. While the WHO (2004; 2014, p.1) endorses harm reduction in needle exchange programs, it recognizes that the issue is controversial in tobacco control for the reasons stated previously (basically involving the tolerance of for-profit companies selling a highly toxic and addictive substance). In particular, it does not cohere with the elimination of nicotine addiction and keeping the industry at arm's length. This made it a challenge for acceptance frames to draw links to the WHO or the central institutions of tobacco control. Instead, they were forced to frame the normative argument differently.

A recurring argument in the acceptance frame is to point out the "perversity" of prohibiting recreational e-cigarettes when conventional cigarettes are already widely available (E13, E14, E15). Some interviewees argued that this amounts to banning the least harmful products while condoning the sale of more harmful ones – in other words, it is like banning beer, but not vodka (E12a, E13). These frames found strong coherence

[42] See for example: http://www.cdc.gov/tobacco/data_statistics/tables/trends/cig_smoking/, accessed November 20, 2015. The U.S. smoking for adults was more than 40% in 1965. It decreased to 25% in 1990, but since then it has only dropped to about 19% by 2011.

among snus proponents (E12a, E12b, E16a, E16b), and e-cigarette proponents were keen to point out that the EU had definitely gotten snus regulation wrong, calling it a "societal mistake and a crime that it isn't more widely available" (E10a, E10b). Acceptance frames in e-cigarettes use these common sense arguments and easily understandable metaphors to appeal more broadly and make opposition seem nonsensical. They also criticize the status quo bias of the abstinence approach, arguing that without less harmful options, people have no choice but to keep buying conventional cigarettes (E14). The abstinence group worries that teens will be lured by e-cigarettes to take up smoking, but the harm reduction group says that without e-cigarettes, they are likely to take up smoking anyway and will be restricted to using conventional cigarettes. Common sense arguments were also used to deride the gateway drug hypothesis, as in, "can beer be seen as a gateway to vodka?" (E12a).

In addition to making comparisons to alcohol and snus, the problems with current NRT products were also brought up as a way to make the avoidance of e-cigarettes seem morally misguided. As mentioned in the section on cognitive strategies, the efficacy of e-cigarettes compared to NRT products is often pointed out, and it is therefore seen as immoral to deprive smokers of tools that they actually like and believe to work. NRT products have been around for 40 years and have yet to disrupt the cigarette market in any way whatsoever (E13). E-cigarettes, meanwhile, have outcompeted NRT products in just 5-7 years – "smokers like them and they have the potential do something good" (E13). Many interviewees also referred to the hypocrisy of allowing controversial smoking cessation drugs like Champix/Chantix,[43] while

[43] Champix/Chantix is the trade name for varenicline, a prescription medicine NRT that has received post-marketing reports of depression, suicidal behavior, insomnia, nightmares, and headaches among users.

arguing for a prohibition of recreational e-cigarettes, which have yet to claim a single life (E7, E17, E18). By juxtaposing drug policies in alcohol, tobacco and prescription pharmaceuticals, these arguments aim to make the incoherent and hypocritical assumptions in these policies more visible. Moreover, they challenge the idea that current drug policy is already evidence-based by displaying the cultural contingency of our acceptance for some risks over others.

To understand the appeal of e-cigarettes compared to NRT products, it is helpful to compare the different identities of smokers that the products imply. NRT products are pharmaceutical and meant to "cure" the disease of tobacco dependency, which implies that smokers are sick, ill-informed and helpless, and they require treatment by the medical profession. But the acceptance frame argues that most smokers do not see themselves as sick (E14). They understand the risks of smoking, choose to do it anyway, but might appreciate less harmful options. The e-cigarette industry sees this as a problem of a demand that is not being met, which reconstructs the identity of smokers as active, responsible, economic agents who lack product choices. E-cigarettes therefore offer smokers a welcome reprieve from the "double stigmatization" (E10a, E10b) they have had to endure in recent years in Western societies – there is shame associated both with smoking and the use of NRT products. This cultural dimension of e-cigarettes is crucially important to explaining their rapid uptake. It manifests itself in "vaping culture" as a form of pride in having retaken the power over your life and health from Big Tobacco and Big Pharma (E18). Vapers have formed movements, congregated in trade shows and conferences, and even protested – it is hard to imagine smokers doing the same due to the stigmatization of tobacco. When we consider vaping culture, it is clear that there is a large group of people who are not interested in kicking their nicotine

habit, but who do want access to less harmful alternatives. The acceptance frame says that it is wrong to remove this option and that ex-smokers should be treated as responsible adults. In great contrast to the avoidance frame, the acceptance frame plays into the interests of a vocal and growing group of concerned citizens.

7.3.2 Fracking: gas as a bridge fuel

When it comes to the fracking study, acceptance frames were overwhelmingly deployed by industry representatives focusing on the benefits of shale gas for the European economy, energy security and climate change. The economic effects were brought up in the cognitive section. Most industry representatives referred to the macroeconomic study commissioned by the IOGP (F5), estimating more than a million jobs created and significant growth. The acceptance frame argues that these impacts, whatever they eventually amount to, ought to be given greater normative weight than the slight and easily controllable environmental impacts (F11). At the time of data collection, no one believed anymore that an American-style shale gas revolution was in the cards for Europe (F5). However, any amount of net job and growth creation would be welcome in a continent still struggling to shake off the effects of the financial crisis and Great Recession. This point was lent an amount of urgency when it was connected to the issue of energy security, especially following the Ukraine crisis in 2013 (F6). European dependence on Russian gas started to look dangerously irresponsible when their relations took a turn for the worse. Following this, shale gas proponents started framing European development as a way to offset imports and ensure energy security (F11). When negotiations started around the possible creation of a European Energy Union, this facet of shale gas received high level recognition (F10), and consequently, shale gas "was almost elevated to the status of renewables" (F9).

In addition to the emphasis on economic benefits and energy security, proponents also started linking shale gas to climate change. This framing relied on two connected narratives about the characteristics and role of natural gas in our energy mix. First of all, natural gas is being constructed as a "clean fossil fuel" by comparing its CO_2 emissions with those of coal: when combusted, coal emits twice as much as natural gas does (F14). Coal is an obvious target for shale gas proponents to attack: gas and coal-fired power plants are direct competitors in the energy supply, fulfilling the same roles of both base load and solutions to the intermittency problem of renewables.[44] The scales and costs of gas and coal plants are also more directly comparable than those of nuclear plants, for example. Furthermore, coal makes up a significant proportion of the EU's energy supply, and that proportion is increasing in some countries due to the currently low price of coal (F9, F15).[45]

The abundance of cheap coal has led some in the European petroleum industry to complain about the "black and green paradigm" that the continent's leaders are inadvertently buying into (F3). In its eagerness to support renewable energy, the EU has been paying less attention to how states solve the intermittency problem, which they are increasingly doing with the help of cheap coal, not gas. Germany is the example most often provided. After its ostensibly green "Energiewende" ("Energy Transition") and the decommissioning of its nuclear power plants, much of the supply shortfall was initially met by reopening coal-fired power plants, leading to rising CO_2 emissions in the following years (Andresen 2014). This is the pattern, the frame argues, that will

[44] The intermittency problem refers to the difficulty of storing renewable energy for later use, necessitating power plants that can easily be switched on an off to ensure a level provision of energy. Nuclear plants, which are difficult to turn on and off on a daily cycle, are better suited for the provision of base load, exclusively.

[45] The low price of coal, of course, is a consequence of American exports flooding the world market as the U.S. switches from coal to gas-fired power plants.

define the European energy landscape as costly renewables inevitably lead states to increase their reliance on coal as a cheap solution to the problems of intermittency and shortfall. Instead of coal, the European petroleum industry is beginning to frame natural gas as the perfect complement to renewables, which will lead to emission decreases as long as they replace dirtier coal plants (F3).

This leads to the second part of the narrative about the future role of natural gas: gas as a "bridge fuel" (F8, F15, F16, F17). The reason we need gas (or coal or nuclear) on our energy grid is because it is impossible to shift to 100% renewable energy in the short term, due to both costs and feasibility. Even if the enormous required investments were provided, the argument goes, current technologies are unfeasible to scale up to the levels required by modern societies for a number of reasons, land use possibly prime among them (MacKay 2008). In the acceptance frame, the idea is that it would be irresponsible to rapidly abandon fossil fuels if we want to sustain our current standard of living – and natural gas is the best fossil fuel to complement the gradual switch to renewable energy. Part of this framing relies on cognitive claims, but it is ultimately a normative argument about how we ought to face climate change given the modern world's reliance on fossil fuels. According to the acceptance frame, when NGOs argue for a rapid switch to renewable energy, they are being disingenuous about what that would imply for our modern standard of living (see also Klein 2014). Fossil fuels are hence reframed as a necessary evil in the short term, but also as inherently good due to their role in building the modern world and supplying governments with jobs and tax revenues (F5).

Some interviewees pointed out what they perceived to be a paradox or "catch-22" in European fracking regulation that is making it difficult for the industry to

approximate to what extent the benefits of shale gas could be realized in the EU. Specifically, the paradox stems from the obligation or recommendation that the industry provide assessments of the environmental and economic impacts of drilling before they begin, but to get the data needed for these assessments, they have to drill (F6). The companies working both in the U.S. and the EU said that this was really a matter of culture: the lack of an oil and gas culture in the EU and a more risk averse and careful regulatory tradition. In the U.S., on the other hand, they "drill first and ask questions later" (F9), meaning that when the matter of a fracking mandate came up, American industry could point to production numbers and job creation in rural areas. In the EU, that mandate has to be established before drilling. The industry is still far from realizing production on a commercial scale in Europe – the few wells they have been drilling are meant as pilot projects to investigate European potential (F3). Acceptance is thereby constructed as a precondition for gaining greater knowledge, linking this frame back to the prevention strategy.

In connection to this point, it is important to point out that the Commission would never have taken up fracking on its own if it was not for the amount of public pressure the issue was under (F4). As mentioned, the volume of European activity is still very low today, energy is traditionally the remit of Member States, and normally the Commission would draft technology-neutral legislation instead of specifically targeting a single technology – all of which indicates that the fracking recommendations were unusual in a number of ways. The recommendations communicate on what grounds the EU should be willing to allow further exploration activities, and they are therefore a way for the Commission to frame acceptance of the risk object. They must be seen as a way for the Commission to balance the industry's threat of exit (F4, F9),

legitimate business interests and claims to expertise on the topic with the intense public scrutiny. For Commission officials, the question of a mandate for fracking has already been settled: "it is the view of the Commission that there is a role for fossil fuels in the coming decades and that exploration makes sense to offset import dependency" (F4). In other words, the Energy Union negotiations established that unconventional resources should be explored as legitimate options to ensure energy security (F9). For the Commission officials working on the Recommendations, it is simply their task to investigate to what extent they should get involved "in making it safe" (F4). The mandate for their work was never in question, as it was seen as a political decision that was settled elsewhere. In the acceptance frames, we see the same technical and pragmatic cooperation between the Commission and the industry that we also saw in the prevention frames.

7.3.3 The limits of normative frames

If cognitive framing strategies fail to establish a new consensus due to underlying normative and relational tensions, normative framing strategies also fail due to underlying cognitive and relational tensions. Leaving aside the question of whether people choose beliefs according to knowledge or knowledge according to beliefs, we can establish, at least, that there is a marked coherence between cognitive and normative framing strategies. More interestingly, this coherence seems to play an important role in sustaining the relations among policy actors, and between policy actors and the public. Frames are directly connected to social structure. As in the cognitive contest, the normative frame usage by policy actors differs in how they appeal to the public and how much moral value they place in emotions. In the e-cigarette case, avoidance frames appeal to central institutions in the scientific landscape of public health and tobacco

control – acceptance frames appealed to common sense arguments and public sentiment. Vice versa, in the fracking case, avoidance frames appealed to public sentiments and fears, while acceptance frames were targeted at policymakers and experts and left aside the question of what the public wants. These differences came to have a significant impact on the policy outcomes, which will be explored in the next chapter.

Normative frames are about contested visions of the future: how ought we to respond to the crises of climate change or the smoking epidemic? Which future arrangements of energy use, greenhouse gas emission, nicotine addiction and smoking rates are desirable or permissible? There are clear links between cognitive and normative frames, as the answers to these questions depend on what information policy actors have access to and prioritize and how they project this into the future. On policy questions marked by lesser degrees of public controversy or scientific uncertainty, it is easier for regulators to weigh the merits of both cognitive and normative frames and establish preferred ways forward. On difficult questions, relational framing strategies therefore increase in importance – they seem to function as a pressure valve that relieves the rising tensions in the policy debate caused by incongruent cognitive and normative positioning.

7.4 Relational framing strategies: trust

Status and reputation are indispensable markers of quality in markets where it is difficult for customers to otherwise appraise the quality of a product or producer due to different sources of uncertainty (Podolny 1993). The greater the uncertainty, the more participants will rely on status as a signal of quality (Podolny 2005, p.18). Consider, for example, the importance of guarding your reputation in the markets for fine wines,

jewelry or investment banking. When it comes to policymaking, a domain of social affairs in which quality is even more difficult to ascertain, we should similarly expect actors to make inferences about the quality of policy proposals or positions on the basis of status. In politics, "quality" should be thought of as not only the fitness and feasibility of policy solutions, but also as a signal of the trustworthiness, and hence legitimacy, of actors. Relational framing strategies attempt to manipulate status in policy debates, primarily by focusing on questions of trust.

How do social actors estimate the status of others? Status is "fundamentally a consequence of the network ties that are perceived to flow to the actor" (Podolny 2005, p.5). The presence or absence of network ties between actors thereby become the basis on which inferences are made about the underlying qualities of those actors. On a different level, the overall pattern of relations in a market serve as a guide for actors to determine exchange partners. Status "leaks" through these exchanges, or in other words, through network ties: exchanges with higher-status actors bestows some of that status upon yourself, while exchanges with lower-status actors can decrease your status (Podolny 2005, pp.14–16). Relational frames focus on network ties between different actors. In doing so, they differ from normative and cognitive frames that focus more directly on the risk object. They either interpret the perceived existence (or absence) of network ties between actors, or they construct (or delete) network ties where previously none (or some) were broadly recognized. The frames then communicate these relations more broadly with the purpose of manipulating the status of actors. These frames signal where to place trust or mistrust, and thus, how to perceive the network of relations among policy actors as a whole.

Relational framing strategies seem especially important in the current case studies, marked as they are by high degrees of uncertainty, precluding the establishment of a cognitive consensus, and high degrees of controversy, precluding the establishment of a normative consensus. This dual instability leads to recursive cycles of cognitive and normative framing that goes on and on until it gets broken by a relational framing. Actors are essentially saying of their opponents: "we will never reach agreement because you are fundamentally untrustworthy." The buck stops with relational frames. The argument that I am making here is simple: when we cut through the layers of cognitive and normative rhetoric, we find at the base a hard, unyielding crust of relational tension, created by disagreement over whom to trust or mistrust. Importantly, much of this tension is perceived as emotional or irrational, and it is therefore devalued and left untreated when policymakers, acting on the assumptions of TRA, neglect to engage with it.

Trust frames are relational framing strategies that invoke or create network ties between actors as a way to signal trustworthiness. In the interviews, it was most frequently used by industry actors reacting to allegations that their technologies and ethics were threats to the public interest. But all actors on both sides of the issue put forward notions about where to place trust. By looking at how trust is differently framed in the interviews we are provided with a picture of the relational underpinnings of the field and its central sources of status.

7.4.1 Trust in the e-cigarette case

Beginning with e-cigarettes once again, the general strategy for proponents was to frame the public in general, and the vaping movement in particular, as being trustworthy and an important source of credible knowledge and legitimacy (E10a, E10b, E20). This

strategy took several different forms. First of all, the frame emphasizes the role of the movement in swaying negotiations in the Parliament. It was often argued to be the primary reason that medicinal regulation got overturned, and the movement was framed as a "consumer movement" and a "strong campaign" that "arose spontaneously because people were passionate" (E20). Another interviewee called the vaping community a "true grassroots movement" and a "rebellion of ex-smokers – out and proud" (E10a). These labels also recognize the emotional appeal of the movement as something valuable, not irrational, by comparing it to gay rights movements ("out and proud"). Ex-smokers were seen as "coming out of the closet" to demonstrate in front of the European Parliament – "could you imagine regular smokers demonstrating?" (E10a). For a group that has become increasingly stigmatized in recent years, e-cigarettes and the vaping community provide empowerment, and a good part of the vaping community has no interest in quitting nicotine (E18). Proponents recognized this and see it as something to be embraced as a progressive attitude towards tobacco policy. Trust should be placed in the public and in the vapers who now have the tools to reduce the harm of their habit. In this frame, vapers are hence constructed as active, responsible and capable agents.

The lobbyists who made these arguments would surprisingly downplay their own role in the proceedings, by saying that a straight fight between them and the lobbyists representing "big pharma" would have gone the other way (E20). This is another way of saying that the public was crucial for clinching the victory, and it was a legitimate victory because of the public's involvement. By creating links to the vaping movement, the e-cigarette industry increased their status in the European Parliament, where public opinion is the most valuable currency. Another interviewee called the

Parliament "the voice of reason" in this debate (E10a), implying that trust should be placed in this institution instead of the Commission or Council. An important side to this story is the emphasis that proponents placed on the "unprecedented" outcome of the policy debate – normally, if the Commission and Council agree on something, it is almost sure to become law; but here the Parliament convinced both of them to change or soften their positions (E10a). The unlikelihood of this outcome is also interpreted positively, as a victory for the underdogs: "you basically had the WHO, Commission, and various scientific studies on one side, and these 'used car salesmen' with vested interests on the other. It's remarkable that they had so much influence" (E6). By comparing e-cigarette industry representatives to "used car salesmen", it is clear that proponents were not relying on the questionable status of the nascent and rebellious e-cigarette industry to carry the day – rather, their links to the public were instrumental.

By placing trust in the public, the vapers and the Parliament, the proponents also implied that lay expertise was a credible source of knowledge in the debate. To support that position, however, it helped to also draw links to the Royal College of Physicians and the anti-smoking NGO ASH (Action on Smoking and Health), two British institutions that had recently started to communicate in favor of harm reduction strategies (E16a, E16b). The opinions of both of these institutions carry weight: they are both considered high-status actors in public health and tobacco control. Although their opinions collided with the hard core of the tobacco control community, they lent some academic weight and substance to the e-cigarette proponents, who would otherwise have to rely exclusively on lay expertise and Swedish snus studies. Of course, the relational frame cares not for the content of the academic arguments. In this case, it is

the mere fact their opinions coincide with those of the proponents that relationally positions them in the same camp.

In contrast to the broad and inclusive relational frames of the proponents, those opposing e-cigarettes tended to employ narrower relational frames that placed trust in mainstream medical and public health experts (E1a, E1b, E2, E3, E11, E19). Specifically, this frame tells us to trust in the institutions of science and the relevant professions as the only legitimate providers of policy solutions in this area. Those supporting medicinal regulation placed much trust in the regime of pharmacovigiliance, by which new drugs are tested in randomized controlled trials and continuously monitored for efficacy and side effects. This was seen as the safest way to deal with the policy issue: "pharmacovigiliance has a proven track record for ensuring quality and safety of products" and "is an appropriate way to discover and mitigate risks as they emerge" (E1a). The Commission was also framed as "a bright bunch of people" who "do their job well", always suggesting "sensible regulation" (E3). For this group, relational frames drew links between science, experts, the Commision, the WHO and pharmacovigiliance to construct an evidence-based coalition in opposition to the irrational, emotional and easily manipulated vaping community.

7.4.2 Trust in the fracking case

When we move to the fracking case study, the strategies are reversed: here we see the industry and its supporters creating narrow, technical coalitions while the opposition draws more links to the public and uses emotionality. Trust frames were used most often by the oil and gas industry, as they were defending the integrity and moral standing of their operations in the face of sometimes extreme allegations from fracking opponents. The trust frame can be summed up in the statement: "No one else but the

industry has the expertise" (F17). It is closely related to the prevention frame. When arguing for trust in the industry, proponents refer to how it is based on more than a century's worth of petroleum engineering knowledge, and a proven track record in terms of providing safe hydrocarbon exploration and production operations. For example, out of the 6,000 wells drilled in the Netherlands, there have been no cases of leakage to water-bearing layers (F12). Although isolated accidents have happened, there is no evidence of a systemic risk on the scale implied by the NGOs.

Others speaking of the industry would also bring up their risk-averse nature and long-term visions: "they know that making any mistake will allow the green NGOs to throw them out" (F13). The industry hence guards its Brussels reputation very carefully (F2), but recognizes that they are not seen as the most trustworthy of industries (F6). To project trustworthiness and increase their status, the industry drew links to expertise: they used prevention frames to support trust frames. Some academic experts also became affiliated with an industry communication platform called Shale Gas Europe,[46] which was administered by the public affairs consultancy FTI Consulting. The purpose of this platform was to communicate the prevention frames towards the public in order to begin addressing the issue of public acceptance more broadly (F2). The close links between the industry and scientific and engineering expertise is being used not only to argue for the safety of the risk object, but also relationally to foster trust in the industry due to their association with impartial academic experts.

This link between expertise and trust works well when targeted at certain areas of the Commission. The industry spoke highly of the professional relationship they enjoyed with Commission officials (F6, F17). Not surprisingly, DG Energy and DG

[46] See www.shalegaseurope.org, accessed November 16, 2015.

Enterprise & Industry are seen as more knowledgeable and reasonable, whereas DG Environment is seen as less open to industry arguments (F2, F5). Overall, however, the industry does place trust in the Commission's officials, which they recognize as having a very good understanding of the processes and as willing to engage with and look into the science (F3, F11). Their relations are framed as professional and formal, dispelling any myths of shady, informal and cliquish dealings (F17). Viewed from within the Commission, the industry has legitimate business interests and the most comprehensive understanding of the processes and risks. Relations of trust between the Commission and the industry are entirely based on expertise. Both groups are committed to the technical approximation of risks and countermeasures and have built a partnership to that end, of which the Joint Research Centre's (JRC) "European Science and Technology Network on Unconventional Hydrocarbon Extraction"[47] is the prime example. The purpose of this Network, which was established as a result of the Recommendations, is to gather technical and environmental data on current exploration projects and technologies. The Network does not give policy advice and is clearly framed as a purely scientific exercise. While there is participation from NGOs, they have voiced numerous criticisms of the Network, mostly hinging on the dominance of industry representatives within it (see for example: Corporate Europe Observatory & Friends of the Earth Europe 2015). I will return to the Network in more detail later – I mention it here as evidence of frame coherence and trust between the Commission and the industry on the narrowly technical framing of fracking that does not deal with larger questions of public acceptance and mandate (which are seen as already settled).

[47] See https://ec.europa.eu/jrc/en/uh-network, accessed December 2, 2015.

For the NGOs, trust frames drew links to two main targets: science and the public. Concerning science, the NGOs positioned themselves as objective and trustworthy by linking primarily to peer-reviewed studies and reports from public and international organizations and agencies that emphasized risks and negative environmental consequences. Challenging industry expertise, they would accuse them of cherry-picking studies and relying on their own fundamentally dubious data (F1). Their own scientific interpretation was presented as more trustworthy. They would also link to the science on climate change, from which they derive their mandate: "Our NGO is focused on how we can best avoid more than 2°C of climate change. There is no financial gain to that activity – it is what the science says we should do and therefore what I believe is right to do" (F1). This creates a seamless link to the other main target of their trust frames: the public.

The NGOs framed themselves as being trustworthy because they were acting in the public interest, specifically by focusing on the issue of climate change. Public opinion itself is also trustworthy and important, and the NGOs focused much more on the lacking public acceptance of fracking than the industry did (F1, F18). In relation to the Technology Network, the NGOs viewed it as deeply problematic for not addressing public acceptance, thereby questioning its entire mandate (F18). They frame anti-fracking sentiment in Europe as a natural and bottom-up reaction of the public rather than a transnationally organized environmentalist network. Similar to the vaping community in the e-cigarette case, those who support the social movements emphasize their bottom-up nature as a signal of legitimacy, while those who oppose them frame the

movements as top-down, transnationally organized "astroturfing"[48] that is not representative of true public opinion.

7.5 Relational framing strategies: mistrust

Trust frames are used by the policy actors to tell us stories about themselves and their supporters – mistrust frames tell us how they view the opposition. Frames play an important role in discursively constructing the coalitions and determining the patterns of social relations in the field. Mistrust frames are weapons to attack the status of opponents, and it is by analyzing them that we get a clear picture how the battle lines are drawn. It is an interesting, and perhaps worrying, observation that they were by far the most frequently employed frames in the interviews. And they were frequently used by nearly everyone – there is no clear group of policy actors who used them significantly more or less than others.

7.5.1 Mistrust in the e-cigarette case

From the perspective of the e-cigarette industry, the medicines and drug regulators (be they domestic, international or transnational) and "big pharma" are in cahoots. Some interviewees hinted at a too close, "incestuous relationship" between the two (E17) and accused DG Sanco of giving preferential treatment to the pharmaceutical industry, for example by giving them privileged access to TPD negotiations (E16a, E16b). These interviewees would point out the hypocrisy of inviting pharma to tobacco negotiations, but not inviting tobacco to pharma negotiations over NRT products. They would also indicate the "schizophrenic battle" (E16a, E17) that tobacco regulators are engaged in: they want to kill tobacco, but they rely on them for excise taxes. It is because of this

[48] Astroturf is artificial grass – the metaphor is meant to highlight the artificial and false character of vested interests that masquerade as "grassroots" social movements.

close relationship, argue the e-cigarette proponents, that NRT products even got approved in the first place. With failure rates in the upper 90% and a host of worrying side effects, it is surprising they ever got the green light (E17, E18). According to this logic, the initiative to turn e-cigarettes into pharmaceutical products was an initiative by big pharma to protect their rapidly decreasing NRT market, which was struggling due to pressure from e-cigarettes (E7): "It's all about the money. Pharma wants to control the category" (E17). The fact that the original demands to regulate e-cigarettes as medicines in the UK came from the pharmaceutical industry was seen as supporting this argument (E7, E18). Even if there is no collusion between the two to speak of, the abstinence group is still accused of promoting NRTs due to its dogmatic campaign on nicotine and the tobacco industry: "they don't want to fix public health - they want to get rid of nicotine" (E16a). The harm reductionists framed their opponents as overzealous tobacco controllers and trigger-happy regulators who make up the "nanny state" (E10a), making the appeal of the frame to liberal politicians clear. By drawing these links, the e-cigarette proponents accuse the opponents of having fallen prey to the vested interests of the pharmaceutical industry and overregulating a leisure activity that adults should be free to choose.

While the e-cigarette proponents agreed that pharma were the main opponents (not big tobacco, who were focusing on other items in the TPD), they disagreed on ways forward. A schism emerged within the e-cigarette coalition during the course of negotiations, with the Tobacco Vapor Electronic Cigarette Association (TVECA) on one side and the Electronic Cigarette Industry Trade Association (ECITA) and Totally Wicked (TW) on the other side. TVECA viewed themselves as pragmatic in working for a compromise solution (E10a, E10b), and they viewed ECITA and TW as rebellious

newcomers who do not understand Brussels and are trying to change the rules of the game (E17). Conversely, ECITA and TW viewed TVECA as "an abomination" (E15), a front for one company to bend the rules to fit their products (E18), and as sellouts for putting "tobacco" in their name and not distancing themselves sufficiently from that industry (E7). Even within the e-cigarette industry, there are varying interpretations of how the products should be defined, and especially, whether their close association with cigarettes and tobacco is an advantage for their uptake or a disadvantage to their image. All e-cigarette representatives agreed on the similarities between this case and the Swedish snus case, but many were reluctant to ally with snus representatives, fearing it would endanger their own project ("the ship has sailed for snus" [E10a]).

When we look from the perspective of the abstinence group, mistrust frames are used less frequently. The group's strict adherence to the evidence base may account for this – on the surface, they seemed less preoccupied with the political reality of the negotiations. Mistrust frames, to the extent they were deployed, were directed towards the e-cigarette industry and the vaping community in particular. Regarding the industry, the abstinence group accused them of exaggerating claims and making the debate too emotional (E2). The lobbying tactics of the e-cigarette industry were seen as abrasive and tactless (consider the comparison of their lobbyists to "used car salesmen" [E6]). One incident in which TW sent out hundreds of e-cigarette products as gifts to the offices of MEPs was often brought forward in interviews – "in 15 years, I have never seen anything like it" (E2). Their image was not helped by the "aggressive and unsavory" e-cigarette advertisements that had been circulating, for example of a woman exhaling e-cigarette vapor into a stroller.[49] There was no interest in finding common

[49] See https://www.youtube.com/watch?v=FMcsYnmH5R4, accessed December 2, 2015.

ground with the e-cigarette industry: “their goal is to profit off the sale of nicotine, and that is a conflict of interest with what we are pursuing” (E1a). Many in public health were also concerned that big tobacco were starting to move into the e-cigarette category, potentially in order to promote dual use to sell more cigarettes (E1b). The tobacco industry casts a long shadow over the whole e-cigarette market, decreasing its status in the eyes of its mortal enemies.

Regarding the vaping community, there was a clear tendency for the abstinence group to view them as “definitely manipulated by the e-cig industry” (E3). The most vocal members of the vaping community were also perceived as coarse and thuggish individuals, the types of people who could stoop to such moral depths as launching vitriolic personal attacks on physicians and regulators working in the public interest. The personal attacks against Linda McAvan, the rapporteur on the TPD, caused her to launch a formal complaint with the e-cigarette industry, indicating that the opponents did not see much of a difference between the industry and the vaping community (E3). Vapers were a new and unknown player in the tobacco control debate, and it was a novel experience for the public health community to have their policy briefings and documents analyzed point by point in social media (E19). Due to the novelty of the group and their association with a dubious industry, they were framed as untrustworthy. Vapers were not responsible adults who were taking harm reduction tools into their own hands – rather, they were victims of a faddish nicotine product and the newest offshoot of a deadly industry. By extension, the Parliament was not seen as expressing legitimate public interest when it overturned medicinal regulation – it had fallen prey to the vested interests of the e-cigarette industry, which had shrewdly manipulated a small segment of the public, the vapers, into giving an impression of mass public support for free vaping.

7.5.2 Mistrust in the fracking case

In the fracking case, we witness the same use of stigmatizing attacks, but with a reversed framing of the public. Fracking proponents frame the public as untrustworthy, while e-cigarette proponents framed the public as trustworthy. The most common complaint among industry actors in the fracking case was that the NGOs had been incredibly successful in spreading misinformation and hysteria in the public debate (F2, F3, F5, F6, F14, F17). Most recognized that the NGOs had a good understanding of the science and the risks, but the way they communicated "transformed reality" (F14) or "twisted and tweaked" (F3) the debate, for example by emphasizing the intensity of impacts and not the probability of occurrence (F14). The NGOs were accused of relying on shock images (such as the burning water tap from Gasland) and scenarios, because "it is easier to scare people than reassure them" (F17). Because they are seen as knowledgeable, but still choose to communicate in this fashion, the industry frames the NGOs as untrustworthy and "a bit devious" (F6).

In communicating these images and scenarios, NGOs relied on social media much more than the industry did. Industry representatives saw social media as a particularly well-suited platform for the NGOs to propagate shock and hysteria in easily condensed packages of information that could go viral (F5). The industry's own communication was framed in more technical and scientific terms, with lots of numbers and long reports – not the sort of material that tends to go viral (F5). Letting the NGOs control the public debate was "the major strategic error" that the industry committed, in their perspective (F6). Public-facing communication from the industry was restricted to the local communities in which they were operating, and the broader public debate was ceded to the NGOs. There is a clear assumption of a deficit model of public

understanding of science in the industry's mistrust frames. The public is seen as having been swayed and manipulated by NGO communication, and if only they properly understood the science, they would support the industry's position.

In trying to make sense of the NGOs' tough opposition to fracking, the industry saw it as a case of ideology (F2). The NGOs were framed as opposed to any form of fossil fuels and to industrial development in general (F17). They were seen as unreasonable and guilty of wishful thinking, whereas the industry is pragmatic and recognizes the necessity of fossil fuels in the short to medium term (F5). The industry finds support for its position when indicating that both the Commission (even DG Environment) and some of the large environmental NGOs admit that we need gas as a bridge fuel before transitioning to a low-carbon economy (F5). The anti-fracking NGOs in Brussels argue for an immediate halt to fossil fuel exploration and much greater investment in current generation renewables and energy efficiency (F1, F18), but this energy strategy has yet to find high-level political support. Because of this, the industry can frame the NGOs as too idealistic. A more controversial framing of the NGOs was also put forward multiple times that displays the deep level of mistrust between the sides: they were accused of taking Russian money to drum up the shale gas controversy, thereby keeping Russian gas exports flowing (F5, F9). The fact that the NGOs enjoy much public support is understood to be a symptom of the "lacking oil and gas culture in the EU" (F14). The European public and policymakers are also seen as too risk-averse – "the U.S. produces shale gas, the EU produces reports on shale gas" (F5). Others complained that the European public in general is opposed to change, to industry and to fossil fuels, and that we are too spoiled and rich (F17). The European public is thereby constructed as anti-progress and anti-modernity, whereas the oil and gas

industry are hard-nosed realists who do the thankless job of keeping the engine of the economy running.

As we shift perspective to the NGOs, a different picture emerges. What they see is evidence of collusion between the Commission and the industry to force a risky new fossil fuel down the throats of a public who is fed up with the lack of action on climate change (F1, F18). For the NGOs, the public is not misinformed but expressing righteous outrage at a technocratic elite that is out of touch with common people and enthralled to the vested interests of industry. The best illustration of this is the JRC's Technology Network, which Friends of the Earth Europe walked out of in protest, and they subsequently published a report on industry control of the Network (Corporate Europe Observatory & Friends of the Earth Europe 2015). The industry-backed science that dominates the Network is seen as unreliable due to conflicts of interest (F1). The NGOs view European shale as a project to make natural gas into a destination fuel, not a bridge fuel (F18). In this perspective, regulators have succumbed to industry blackmail of taking operations elsewhere if they make it too difficult to drill in Europe.

The Commission faces the daunting task of ameliorating this deep divide through balanced policy, and they were less prone to frame mistrust in either side because of this. However, within DG Energy and DG Enterprise & Industry, the NGOs were viewed with mistrust and DG Environment was accused of "ideological contamination" (F9). DG Environment was seen as being overzealous in proposing a Directive and were asked to resubmit their Impact Assessment because of this (F10). Many complained that the debate had become too politicized, partly because of DG Environment's too close ties to the green movement (F10), whom "they treated as partners, not lobbyists" (F9). This made it difficult to construct rational and evidence-

based policy. Some viewed this "exaggeration of risks" as a politically motivated defense of renewables and energy efficiency, which was seen to be under threat from a newly discovered fossil fuel source that could derail current efforts in combating climate change (F8). Because of this, the NGOs came to be seen as an unconstructive voice in the debate: by demanding only the very best, they obstructed the search for good compromise solutions – "the best is the enemy of the good" (F8). The walkout from the Technology Network was a big blow for DG Environment, who fought hard to get them back as they were seen as a needed voice in the debate (F1, F4). While the NGOs' goal of discrediting work in the Network was advanced (the story got picked up by, among others, The Guardian [Neslen 2015]), the consideration of mistrust frames within the Commission shows that the NGOs were increasingly ostracized from the technical discussions on the fracking question by their repeated questioning of the mandate for the whole endeavor.

7.5.3 Relational tensions in framing contests

The previous sections suggest that policy actors resort to relational framing strategies as a way to use status to navigate uncertainty and controversy (cf. Podolny 2005). When cognitive and normative signals fail, relational strategies are what is left (Vollmer 2013). In policy debates, these strategies take the form of trust and mistrust frames as signals of political legitimacy. However, as seen in the analysis, these frames are always reliant on supportive cognitive or normative frames: trust can be signaled with the help of either expertise or public opinion. And here we see that strategies diverged in the two case studies. The pro-fracking group signaled trust in their technical mastery of the topic and targeted these frames narrowly at the Commission, leaving the question of public acceptance aside. This seems to have worked within the Commission, as we witness

frame coherence and a gradual ostracizing of the NGOs from the debate. The pro-vaping group signaled trust in lay expertise, anecdotal evidence and public support. This worked within the Parliament, where public opinion is the most valuable currency. The anti-fracking group lost the technical debate, but won the public one. Although the industry escaped strict, binding regulation, they have not won a social license to operate. The anti-vaping group won the technical debate, but lost the public one. Article 20 of the TPD is seen as a scientific mess, but a victory for vapers who were expecting much worse.

We can conclude from the analysis that relational framing strategies, and in particular the way public opinion is constructed within them, are important determinants of frame power. The cases suggest that technical frames that construct the public as irrational and emotional in controversies work within the Commission, but naturally have less traction in more public forums such as the Parliament. The central sources of status vary in different forums. More importantly, victories won by technical frames may be superficial if public opinion is unchanged by the policy outcome. Although the chapter layout suggests a straightforward progression from cognitive to normative to relational frames, they were observed as concurrent from the onset of the debate. Discourse is not linear; actors continuously respond to new pieces of information in varying and conflicting ways, prompting further responses from others, and so on. Frames are picked and mixed to match the occasion. I would suggest, however, that there is a gradual increase in the use of normative and relational frames over time as it becomes evident that cognitive frames do not suffice. This will be investigated in the following chapter.

7.6 Conclusion

The policy debates around fracking and e-cigarettes in the EU entered Brussels as precaution frames calling for strict regulation or prohibition. In both cases, precaution framers ensured initial advantages by succeeding in having the questions enter the policymaking agenda on their terms: as a call to regulate e-cigarettes as medicines and to propose binding measures to control the environmental risks of fracking. In both cases, these initial advantages dissipated in the transformative stage as contending cognitive and normative frames circulated among a growing pool of policy actors. But if we reflect on why the precaution framers lost their advantage, it seems that they had chosen a poor combination of relational framing and forum. If the fracking question had been treated more extensively in the Parliament rather than the Commission, the analysis suggests that the initial framing would have endured. Likewise, if the e-cigarette question had stayed within the Commission's walls, there would have been very little scope for the harm reduction coalition to change its views. While the current chapter focused more on exploring the content and collision of the various frames, the coming chapter will look closer at how the context and venues changed during the evolution of the debates and with what effects.

Yet, it must be concluded that the initial framing succeeded in leaving a mark upon the policy outcomes. Article 20 kept much of the initial precaution wording and ideas from the Commission's proposal, and it is unlikely that the Commission would even have chosen to put fracking on its work program if precaution frames had not demonstrated such a high degree of public traction initially. In the transformative stage, policy actors are required to work with the materials with which they are presented in

the expansive stage, and this demonstrates an important aspect of the power of first impressions.

The major surprise of the Chapter 6 and Chapter 7 duo is that ostensibly science-driven policy debates such as the technical questions of fracking and e-cigarettes obscure a veritable host of normative and relational assumptions that are left untreated when discourse keeps to the cognitive domain. This in itself challenges the commonly held notion that European policymaking is more information-driven and consensus-seeking than American policymaking (Woll 2012). The cases demonstrate that on some of the most scientifically complicated and uncertain dossiers such as e-cigarettes and fracking, the bureaucratic treatment of science quickly reaches the limit of what it is able to achieve. This is a problem because TRA, on which much of the Commission's legitimacy is built, exerts pressure on policy actors to buy into the logic of rational experts and an irrational public. This meant that both cases exhibited vast lay-expert knowledge divides, and there were very few ideas circulating about how to address this other than educating the misinformed public. Roeser (2012) warns us that conventional approaches to risk that reproduce the lay-expert divide have no option but to face one of two pitfalls: the technocratic pitfall or the populist pitfall. The technocratic pitfall favors analytical thinking, leaving no room for emotions and moral concerns outside those identified narrowly through expert analysis. The populist pitfall favors intuitive thinking, taking the emotions and concerns of the public for granted and inevitable and impossible to change. Both pitfalls result from a separation of emotion and reason, and they obstruct genuine dialogue by making it impossible to address emotions as expressing morally valid arguments. The intense polarization of both the e-cigarettes

and fracking debates are evidence of the pitfalls: the e-cigarettes case fell into the populist one, and the fracking case fell into the technocratic one.

On the surface, all actors did buy into the emotion-reason construction because of the scientific nature of both dossiers, which placed a premium on being perceived as evidence-based. However, when the evidence base turned out to be insufficient to generate a consensus and craft policy, normative and relational appeals became more prevalent and displayed the depths of the controversy over these technologies. Although the cognitive frames hinted at different constructions of the public, this was visibly apparent in normative and relational frames. Those that were willing to relax some of the assumptions of TRA and challenge the emotion-reason dichotomy gained more traction with the public, but it did not influence the way experts and policymakers understood the risk object. Rather, they compromised because it was politically required (the populist pitfall – e-cigarettes), or they stuck to their guns and ignored lay knowledge (the technocratic pitfall – fracking). Emotions matter not because they obscure some underlying truth, but because they are moral expressions in their own right – they are engagements *with* the world, not neurological syndromes (Solomon 1976). The policy debates show very little capacity for most of the actors to deal credibly with the underlying reasons for emotionally charged arguments. They need to do this to escape the pitfalls; they cannot because legitimacy and power is inextricably linked to the separation of emotion and reason.

Chapter 8

Discourse as network: frame usage over time

8.1 Introduction

How did actors change their use of frames during the course of the policy debates on e-cigarettes and fracking? The previous two chapters demonstrated the presence of framing strategies that variously emphasized cognitive, normative or relational dimensions. I suggested that normative and especially relational appeals grew in importance once the limits of cognitive frame usage were reached. In the types of policy issues characterized by the Collingridge dilemma, high degrees of uncertainty dictate that this limit is quickly reached. Cognitive frames focus on the risk object, but when actors start to rely more on normative and relational frames, they tell us about their deeper assumptions about what world they want to live in and who should play a part in it. Building on the insights from the previous chapter, these frames tell us more about the deep structure of the field than cognitive frames do.

This chapter seeks to fulfill two connected goals. First, I will analyze whether there is indeed a progression from cognitive to normative and relational frames by looking at the content of policy actor statements in press articles during the duration of the debates. This would indicate that policy actors, failing to build a winning coalition on the surface level of the policy debate, turn towards deeper assumptions in their

strategic decision-making. Second, I will reflect on the power dynamics of the debates by looking at how actors changed positions through the course of the debate and how those changes correspond to normative and relational positions. Frames are intertwined with social structure, and changes in one should relate to changes in the other. By relying on the Discourse Network Analyzer software program (Leifeld 2013a) in combination with network visualization programs, we can map these structural changes in relations and discourses as network diagrams. I provide details on this approach in Section 2. The logic of this treatment is to provide a fuller picture and explanation of the case studies by operating at a more systemic level of analysis to complement the micro-level interviews.

In the overall structure of the thesis, this chapter serves the purpose of integrating the findings from the previous three empirical chapters into a broader framework that spans the entire duration of the policy debates. Chapter 5 focused on the expansive stage of the issue life cycle by investigating how issue entrance into the policy agenda through initial markings of disruptiveness defined the character of the following discussion. The key difference in the cases lay in the initial degree of public exposure. Chapters 6 and 7 focused on the intermediate stage of the issue life cycle by investigating how the issues were transformed during the debates by various constructions of the risks they posed. The key difference in the cases, once more, lay in how those frames were used to bypass or exploit public opinion. This chapter extends the analysis to encompass the contractive, final stage of the issue life cycle, where the decision has been reached and actors realign positions and adapt strategies to the new reality. Keeping the findings from previous chapters in mind, it seems prudent to pay attention to how power relationships are constrained or enabled by connections to the

broader public. Following on from this, some clarifying remarks are in order as to what might be meant by the idea of "a broader public" in the context of European Union-level policy debates.

A common topic on studies of EU legitimacy is the alleged deficit of democracy, communication or a public sphere. This criticism pertains to the perceived distance or removal of the public from the policymaking institutions in Brussels and the idea that there is no transnational, pan-European community identity. Studies fall both ways on this topic: some find evidence of a true European public sphere in certain policy areas (Koopmans & Erbe 2004; Koopmans 2007; Trenz 2004) and others say we are not quite there yet (Eriksen 2005). Regardless of these debates, it is an empirical fact that interviewees made frequent reference to "the public opinion" and the role of the media and afforded them great causal significance as seen in the previous chapters. How do they gauge the public opinion, and who are the actors that communicate the public opinion or claim to represent the public interest? To fulfill the goals of the chapter while being sensitive to ideas about the public, I rely on an analysis of newspaper articles in this chapter. The previous chapter drew on interview data to unpack the way policy actors thought about and framed key issues in the debates. This interview data filled the content of the different frames and showed us how meaning and risks are constructed. Now I turn to the question of how intensely and frequently these frames were communicated, especially towards the public through newspaper articles. Analyzing the public debate through newspaper articles lets us consider the ways in which argumentation (Hajer 1993; Hajer 1995) and discourse (Schmidt & Radaelli 2004; Schmidt 2008) within the public sphere matters to the policy process. This requires us to interpret the political process as a conflict over discursive hegemony between opposed

discourse coalitions, which is an appropriate interpretation when we are dealing with complex socio-technical problems in the lightly institutionalized transnational domain (Hajer & Wagenaar 2003; Hajer 2003).

This chapter switches the focus from an emphasis on coordinative discourse in the policy sphere to communicative discourse in the political sphere (Schmidt 2008, p.310). Coordinative discourse takes place among elite policy actors and is more highly characterized by expertise and technical detail. Communicative discourse is aimed from the policy sphere towards the broader public and has more to do with how decisions are explained and legitimized. We need to study both to get a complete picture of the policy debate. Hajer (2009, p.4, italics in original) suggests that we are living in the age of mediatized politics, in which media performance is crucial to policy success such that "politics is about who can make his/her claim authoritative *in the scenes and at the stages that matter"*. How do claims become authoritative? Literature on discourse coalitions and policy networks suggests that authority may be understood as a function of network position, such that strategic positions in the network (usually determined by network centrality measures) are associated with greater power (Leifeld & Haunss 2012; Ingold et al. 2013; Carpenter 2012; Breschi & Catalini 2010). In other words, if a discourse coalition dominates the policy debate by demonstrating sustained control (or control at crucial points in time) over the core frames, they are likely to get their way.

On its own, social network analysis (SNA) is a weak tool for demonstrating causal mechanisms, but when combined with other approaches, it is a powerful way of rendering the underlying relational structures more tangible as objects of study that can enter into productive dialogue with other methods of analysis (Buch-Hansen 2014). In other words, the purpose of analyzing the discourse networks is not to reduce the policy

debate to an artifact of SNA in order to predict and generalize, but to open up the debate by providing an additional point of entry for research. The first usage is an example of a positivist position, the second of a critical realist position (*ibid.*). The advantage of the second position is that it avoids modelling actor behavior or outcomes on a narrow set of variables. Controversies are "reduction-resistant" (Venturini 2010, p.262) and are best explored through a plurality of theories and methods that are sensitive to the multiple different viewpoints of participants. So while this exercise will not achieve strong causal claims as to why certain decisions were reached at certain points in time,[50] it serves the purpose of "controversy mapping" (Marres 2015; Whatmore 2009; Venturini 2012). Controversy maps rely primarily on digital methods to capture, analyze and visualize data about public issues. They should not mirror complexity, but make it legible, lending themselves to multiple interpretations and readings. That said, ultimately controversy maps should be judged according to their usefulness: do they tell us something new about the issue?

8.2 Creating the discourse networks on e-cigarettes and fracking

To explore the discourse networks in the case studies, I analyzed newspaper articles from the independent media network EurActiv. EurActiv is the leading online media dedicated to EU policies, and it provides access to all its articles free of charge. They are present in 12 EU capitals, ensuring a good coverage of EU affairs and avoiding any nationalistic bias. With their emphasis on transparency and policy debate, EurActiv

[50] … based on the assumption that any such claim is an artifact of the analysis rather than a feature of social reality, where there are always multiple, overlapping (maybe even contradictory) causes of agent behavior.

brings visibility to the EU policy process by following debates from the pre- to the post-legislative phase and frequently publishing position statements and opinion pieces from all involved actors. Many articles also conclude with a "Positions" section that publishes press statements from a wide array of policy actors. This is very convenient for facilitating the coding process. EurActiv has two main competitors: EU Observer and Politico Europe. EurActiv was found to have the greatest number of articles relevant to the case studies, and Leifeld (2013b, p.177) recommends relying on only a single source for analyzing discourse networks to avoid double coverage of events. For all of these reasons, EurActiv is an ideal source for analyzing discourse networks over time in the two case studies.

A search for the term "shale"[51] in EurActiv's archives turned up 355 articles. All articles were screened for relevance to the case study. 104 were retained. I discarded articles that were not directly related to the case study, such as articles discussing shale outside the EU with no statements from or directed to EU policy actors and articles discussing purely domestic developments within member states and with statements only concerning domestic politics. For example, an article discussing Chevron's decision to halt operations in Romania was discarded because it only contained statements from Chevron directed to Romanian citizens and policymakers. Similarly, articles that only mentioned shale in passing (and included no statements by policy actors) while discussing another topic such as global warming or EU's renewables targets were also discarded. On the other hand, an article on Poland's rising ambitions to promote and extract shale gas was retained because it was linked to the EU policy

[51] I corroborated this search by running another for the term "fracking", which resulted in 101 articles. I screened these to ensure that the "shale" search was comprehensive and had found all relevant articles in the first place.

debate by including statements from Brussels-based NGOs on EU-wide policy. The logic of this selection procedure was to save time and focus only on those articles that most directly involved EU-level (as in Brussels-based) participants.

Searching for "e-cigarettes" in EurActiv's archives turned up only 27 articles, suggesting a large discrepancy in the amount of press coverage the two cases received, as well as the extent to which shale gas was connected to myriad other issues in EU affairs. Out of the 27 articles, 23 were retained. Searches for "vape", "vaping", or "electronic cigarettes" turned up a further 4 articles that were not discovered by the "e-cigarettes" search. I discarded articles according to the same selection logic as in the fracking case. Those discarded included articles on the re-election of a British MEP, Finland topping the "Nanny State Index", Greek tourism, and finally, one on respiratory diseases in the EU that only mentioned e-cigarettes in passing. Although DNA presents robust results even on smaller pools of articles, I opted to increase the number of articles in the analysis by searching for the term "Tobacco Products Directive", which turned up 71 articles. These were then screened and included, also according to the same selection logic. The reason for including these articles is that e-cigarettes were only regulated as one of the articles among many in the TPD, and the discourse network that emerges by looking at the entire TPD as such will be equally interesting for the purposes of analyzing frame usage and actor positions over time. In addition, this is an opportunity to put the Article 20 negotiations in a wider context of the TPD debate as a whole. This brought the total number of articles to 41. Finally, a screening of articles containing just the word "tobacco" added another 11 to the total count, mainly articles concerning the lobbying scandal and resignation of Health Commissioner John Dalli, who was in charge of the TPD legislative process.

To conduct the analysis, I imported the articles into the Discourse Network Analyzer software (DNA; Leifeld 2013). DNA is a program that combines content analysis with network analysis in order to investigate the relations between actors and concepts in a policy debate. The software and method has been applied to a number of different policy debates in various settings, including climate change in the U.S. (Fisher et al. 2013; Fisher et al. 2012), German pension politics (Leifeld 2013b; Leifeld 2016), software patents in the EU (Leifeld & Haunss 2012), the independence of regulatory agencies (Ingold et al. 2013) and policy change after school shootings (Hurka & Nebel 2013). The EurActiv articles were imported into separate files in the software and manually coded in order to identify statements from key persons and organizations involved in the policy debate. Each statement was coded according to four variables: the person making the statement, that person's organizational affiliation, the theoretical category the statement concerned (in other words, frame usage), and a dummy variable signifying agreement or disagreement with the frame contents. The theoretical categories were derived from the previous chapter, in which the interview data provided rich insight into frame contents and the main areas of contention. I organized each frame into those emphasizing cognitive, normative or relational aspects, and specified whether agreement or disagreement was indicative of a preventive or precautionary stance in the case of cognitive frames or an acceptance or avoidance stance in the case of normative frames. The framing scheme was iteratively updated during the course of the analysis to ensure comprehensive coverage of the statements. Appendices 4 and 5 provide an overview of the frames identified in the press statements.

The Appendices contain examples of the types of statements in each case study that correspond to a specific frame usage. Although the initial coding table was derived

from the interview data, revisions and additions were iteratively carried out during the course of the coding procedure in order to better fit statements to categories and comprehensively represent the character of the policy debate. Statements were typically direct quotations from persons interviewed in the article or persons/organizations who gave their position at the end of the article. But I broadened the definition of a statement to also include second-hand reporting of statements as well as the statements of scientific studies carried out by identified persons or organizations. I found it especially important to include studies in the coding procedure given the often scientific character of the debates. In addition to scientific studies, spokesmen from national governments, government agencies, or ministers were coded at the country level (i.e. France, United Kingdom, etc.).

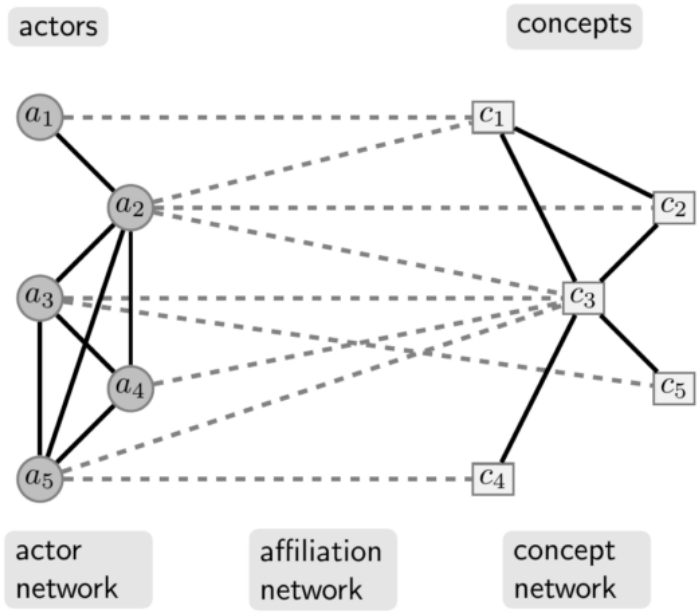
If the same statement was repeated in another article, I counted it again on the assumption that the statement carries more weight in the policy debate if it is repeated in new places and seen by more people. Some sentences could contain multiple statements. For example, this statement was coded as containing both a cognitive frame disagreeing with the "Toxicity" category and another cognitive frame agreeing with the "Quitting tools" category: "A report published in August 2015 by Public Health England (PHE), an agency of the UK's Department of Health, found that electronic cigarettes are 95% less harmful than tobacco cigarettes, and recommended that they should be promoted as a tool to help people quit smoking". Being an official government agency under the UK's Department of Health, the organization was in this instance coded as "United Kingdom". Simultaneously, this statement from Food & Water Europe contains both a normative agreement with the "Regulation" category and a cognitive agreement with the "Environmental risks" category: "In our view, fracking

should be banned, because of the myriad of unacceptable risks involved for our climate, water, air and health". Anonymous or vaguely identified persons were not counted, unless their organizational affiliation could be reasonably attributed (for example, there was no doubt that "EU officials" in many cases could be coded as affiliated to the European Commission – and "tobacco representatives" were included as an organization to include statements from tobacco companies working through lobbying or public affairs professionals). In total, 602 statements were identified in the fracking debate and 344 statements in the e-cigarette debate.

The lists of statements can be understood in matrix terms: there is a set of actors (persons and their organizational affiliations), a set of concepts (the theoretical categories, or frames), a set of binary relations between actors and concepts (agreement or disagreement with frame contents), and a set of discrete time points (dates of articles in which statements were recorded). This matrix makes up the affiliation network, a directed, two-mode network in which statements represent the edges connecting actors to concepts in either a negative or positive way (Leifeld 2012). From this two-mode network, one-mode networks can be computed that preserve the information in the agreement variable. For instance, whenever two actors refer to the same concept in a similar way, a tie can be drawn between the two actors. The more concepts both actors agree (or disagree) on, the greater the edge weight. This type of actor network is useful for picturing coalitions. The same transformation may be applied to the concept level, such that ties between concepts occur when actors mention both of them in the same manner. This type of concept network is useful for picturing how frames combine into more comprehensive narratives or ideologies. The three types of networks and their transformation are depicted in figure 6-1 below. Because each statement has a time

stamp, the networks can be visualized as they change over time to follow the evolution of the policy debate, both in terms of coalitions and discourses.

Figure 8-1. Networks of actors, affiliations and concepts (from Leifeld 2016).



8.2.1 Discourse as network: the affiliation networks of e-cigarettes and fracking

To give an idea of the overall structure of the affiliation networks for the two case studies, figures 8-2a and 8-2b below present the overall discourse networks for the fracking and e-cigarette policy debates. All networks presented in this chapter were created in the network visualization software Visone (Brandes & Wagner 2004). The diagrams have been simplified by cleaning all network ties with strengths of 1 or -1 to increase legibility, meaning that organizations that make only a single positive or negative mention of a frame have been removed. This lets us gain a better overview of the more active organizations and how they relate to the various concepts.

Organizations are depicted as black circles and concepts are gray squares. Blue lines denote agreement; red lines denote disagreement. Darker colors indicate greater weight, meaning a greater amount of statements.

The affiliation networks are useful for confirming that the basic structure of the discourse networks cohere with interview and document data. We find actors agreeing or disagreeing with the concepts we would expect, and the most active organizations occupy central positions in both networks. In the e-cigarette network, there is a cluster of public health NGOs such as the European Heart Network (EHN), European Public Health Alliance (EPHA), Smoke Free Partnership (SFP), and the European Respiratory Society (ERS) all of which are united by repeated normative calls for regulation and cognitive arguments supporting the efficacy of the measures. In the Parliament, this group is backed up by the Greens/European Free Alliance (EFA), the Socialists & Democrats (S&D) and the European Parliament's Committee on Environment, Public Health and Food Safety (EP ENVI). Importantly, they also display very high levels of agreement with DG Sanco in the Commission. The WHO did not involve itself much in the European debate, but from the fringes they also lend support to this coalition. Many in this group frequently communicate mistrust frames towards the tobacco industry, supporting interview data about the intensity of the conflict and the scale of lobbying activities undertaken by the sector, but also hinting at the historical context of this conflict that has seen public health NGOs and tobacco companies clash vehemently for decades.

Figure 8-2a. The affiliation network of the e-cigarette policy debate.

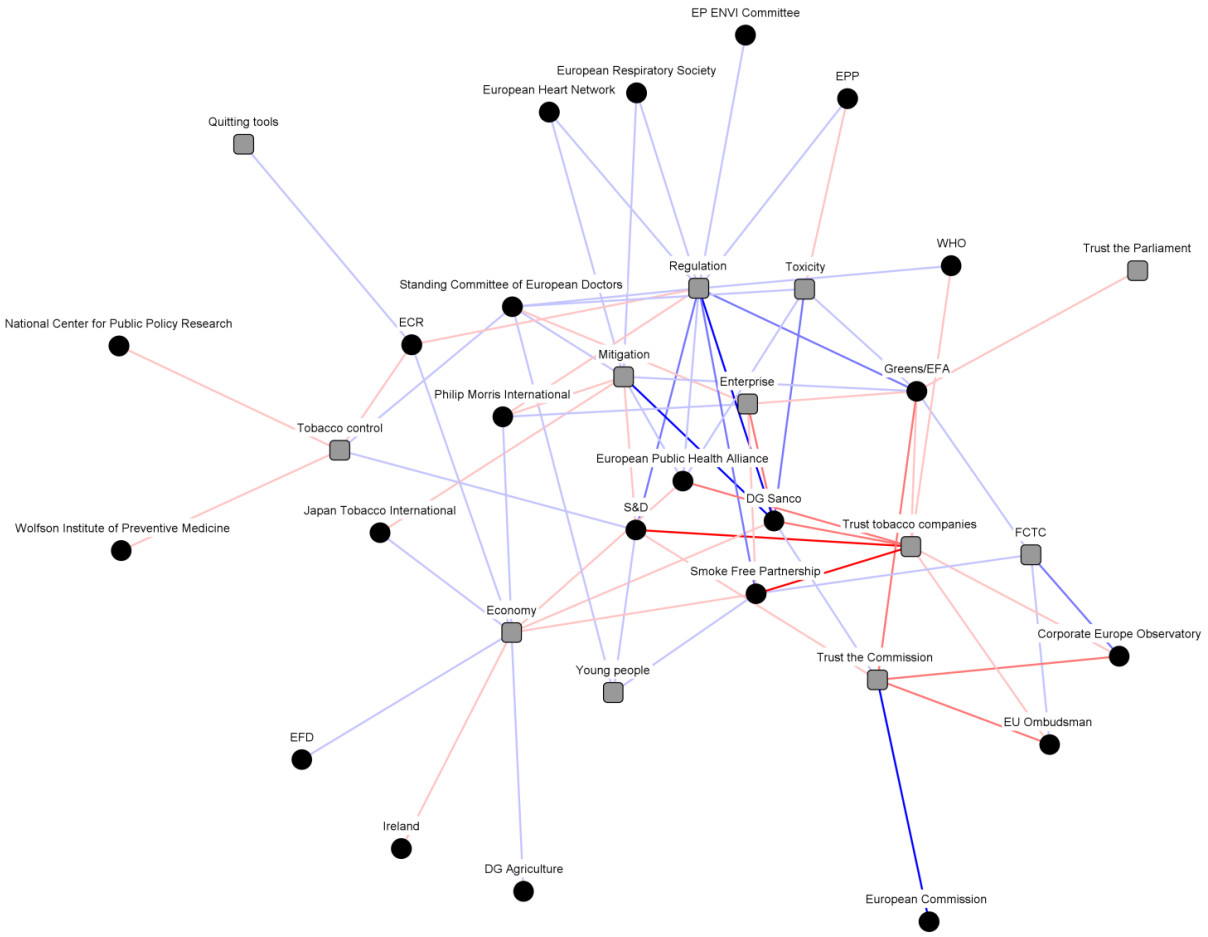
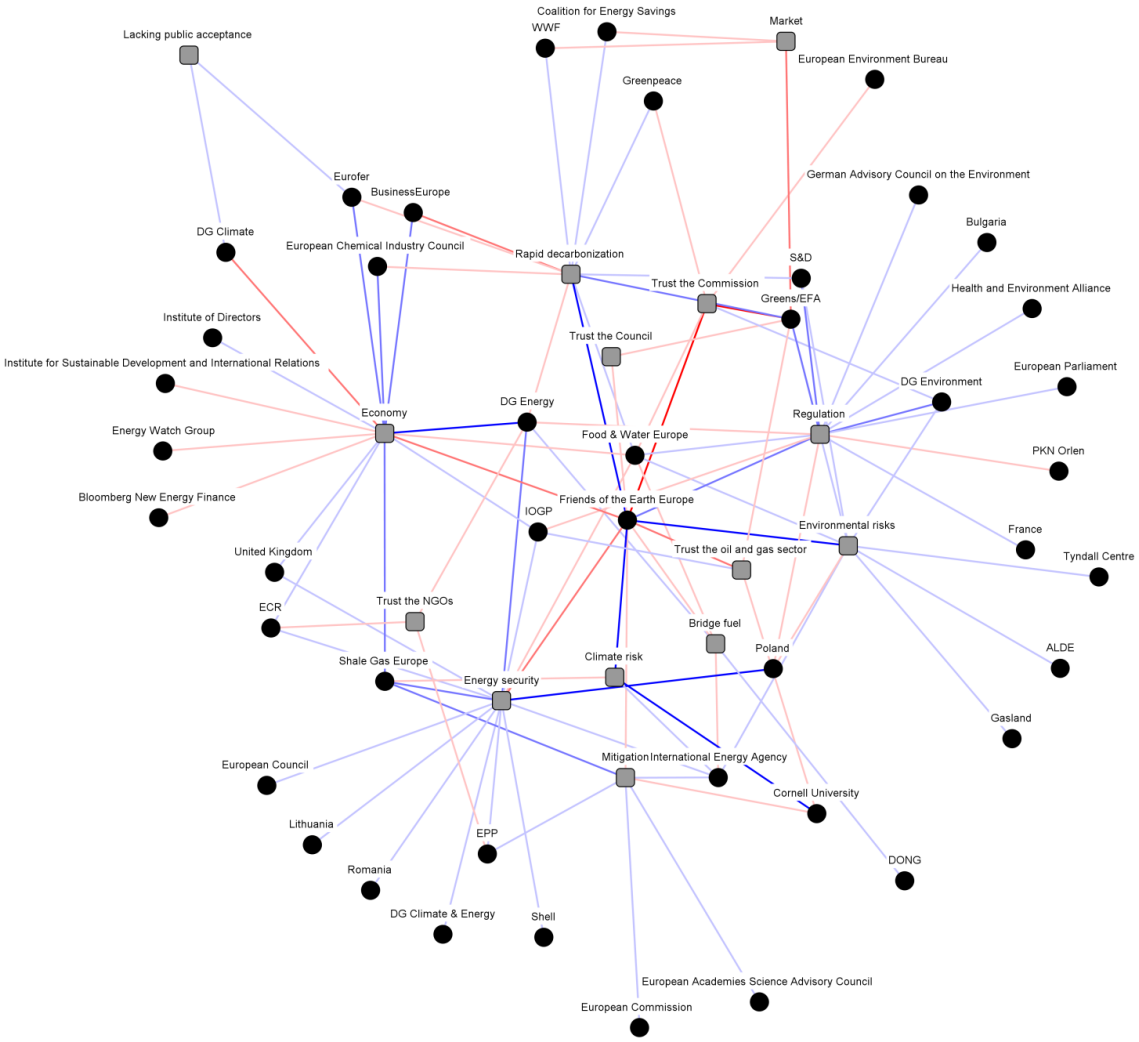


Figure 8-2b. The affiliation network of the fracking policy debate.



The tobacco companies, on the other hand, tended to base their positions on cognitive economic frames, through which they would highlight how much the sector was contributing to Member States through tax revenues and jobs in tobacco farming. The argument was that the proposed regulations would fail to achieve their goals (disagreeing with the "Mitigation" node) while hurting the economy, and they supported this with normative arguments concerning the legality of their operations, adults' freedom to choose, and infringements on their intellectual property through smuggling on the one hand and the proposed plain packaging on the other. They found support for these frames within DG Agriculture in the Commission as well as through conservative and Eurosceptic groups in Parliament (European Conservatives and Reformers [ECR] and Europe of Freedom and Direct Democracy [EFD]). When it comes to e-cigarettes specifically, they were defended as quitting tools by active MEPs in the ECR group, who also challenged the dominant tobacco control regime along with the National Center for Public Policy Research (a conservative think tank in the U.S.) and the Wolfson Institute of Preventive Medicine, based at the Queen Mary University of London.

Moving on to the fracking debate in Figure 6-3, we similarly find a nexus of well-connected and highly active NGOs in the center, with Food & Water Europe and Friends of the Earth Europe communicating very similar frames highlighting environmental and climate risks requiring strict regulation, while disputing economic and energy security arguments. We also find IOGP occupying a central position, but connected to these nodes in a completely opposed fashion, as was to be expected. The Commission's position is also clearly split between DG Energy taking a stance closer to IOGP and DG Environment echoing NGO arguments. Within the Parliament, the

Greens/EFA and S&D land on the environmental side, while the ECR especially, and the EPP (European People's Party) to a lesser degree, support industry arguments. Outside of the oil and gas companies, BusinessEurope and a number of chemical and steel industries or groups also frequently communicate economic frames related to energy prices and pressures on their competitiveness while pointing out the high costs or unfeasibility of rapid decarbonization. Energy security makes up another important node that also shows a strong representation of MS interests: the European Council, Poland, Lithuania, Romania and the United Kingdom all frequently referred to domestic energy situations and how fracking might help MS offset import dependence, particularly on Russian gas. France, Bulgaria and Germany all land on the opposite end, communicating a greater need for caution and regulation. Cornell University and the International Energy Agency both appear as important communicators of climate risk frames.

In sum, the overall structures of the networks seem coherent with interview and document data, although they do bring new actors to our attention. However, the affiliation networks covering the entire time range are too complex and obscure too much information about what was going on during the crucial stages of the policy debate. In the following, I unpack the network data into three different stages and construct actor and concept networks for each stage in order to answer the questions: how did actors form coalitions and what was the debate about?

8.3 Analyzing frame usage over time

Table 8-1 below provides an overview of how the data sorted into three discrete stages of policy debate for each case study. Issues can be thought of as going through "life

cycles" (Morin 2011; Downs 1972) comprised of an expansive, transformative, and contractive stage. I define the first stage as running from the date of the first article on each case (starting in 2010) until the Commission publishes its proposal (in the e-cigarette case) or communicates the introduction of the case into its work program (in the fracking case). I opted to differ between the two cases here in order to ensure a better balance of articles in each stage: the e-cigarettes debate did not really kick off until the TPD proposal was published, while the fracking debate got underway much earlier. The previous chapters also demonstrated a crucial difference in how the two issues entered the policymaking agenda, which supports the decision to treat them differently here: fracking became an agenda item due to public pressure, whereas e-cigarettes came up under internal, routine processes connected to the TPD revision. The second stage runs from the end of stage one until the actual legislative output is finalized and published. This is the stage where we can expect to see the heaviest media coverage and most intense debate. Stage three runs from the end of that stage to the time of writing in summer 2016. Here, actors take stock of their new reality, comment on the proceedings, and the issue gradually leaves public attention. For each stage, I provide the date range, the number of articles found within that range, and the number of statements coded.

Table 8-1. Overview of dates, article and statement numbers in each stage of the policy debates.

Case	Stage 1 - From start until EC proposal published/enters EC work program	Stage 2 – From proposal/work program to legislation	Stage 3 – from legislation to summer 2016
E-cigarettes	17-06-2011 to 19-12-2012 12 articles 75 statements	20-12-2012 to 03-04-2014 19 articles 163 statements	04-04-14 to 11-07-2016 21 articles 106 statements
Fracking	02-07-2010 to 23-10-2012 20 articles 148 statements	24-10-2012 to 22-01-2014 40 articles 227 statements	23-01-2014 to 17-02-2016 44 articles 227 statements

8.3.1 Stage 1: actor networks

Figures 8-4a and 8-4b depict the actor congruence networks in Stage 1 of both debates. Nodes in the network represent organizations and edges are drawn between organizations that communicate a similar frame. For example, if two organizations make a statement in support of the toxicity frame in the e-cigarettes debate, an edge is drawn. If both organizations then also make a statement disagreeing with the regulation frame, the edge weight is increased by 1. In order to make it easier to discern the structure of the discourse coalitions, two treatments are needed: first, edge weights are normalized by dividing each edge weight by the average number of distinct categories used by both actors in an edge; second, edges with a weight below a certain threshold are excluded from the graph (Leifeld 2016). The logic behind the first treatment is to correct for more mediagenic actors such as government actors and parties who would otherwise skew the structure of the network graph by always occupying the core of the diagram and relegating less active actors to the periphery – this makes it difficult to

visualize the coalitions. A similar logic drives the second treatment: when we delete less important edges, structures in the network are easier to identify. The level at which to set the cut-off is a matter of trial and error: the more edges we include, the greater the detail, but the lower the legibility. For the e-cigarette network graphs, I set the cutoff such that all edges with a weight greater than or equal to 0.4 were included. The cutoff for the fracking diagrams was increased to 0.5, because the greater amount of statements required a higher cutoff to achieve similar levels of legibility. In all actor congruence networks, thicker edge width equals greater weight, symbolizing higher levels of agreement between the two nodes.

To make the resulting coalitions easier to identify, I ran a community detection algorithm in the software that detects clusters and draws hyperplanes around similar nodes. I employed the widely used Louvain method of modularity optimization (Blondel et al. 2008), which is the current state of the art. The Louvain method identifies communities within network structures where links within the community are denser than links between different communities. The quality of the community structure thus detected can be approximated mathematically through the so-called modularity function, which the method optimizes. I tested other algorithm options in the software (such as the also very recognized Newman & Girvan method [2004]), and they did not contradict the Louvain results, but did provide less immediately legible results.

The actor congruence networks in figures 8-4a and 8-4b show clear evidence of discourse coalitions at work in the preliminary stages of each conflict, and the coalitions at first glance contain the expected groupings of actors. Both figures display the polarization of policy actors into two distinct coalitions with intense intra-group linkages. The pro-tobacco and pro-fracking coalitions are identified by red hyperplanes;

anti-tobacco and anti-fracking coalitions are in blue. In both cases, we find political parties in the European Parliament occupying central locations and bridging the coalitions. As can be expected of parliamentary debate, these parties tend to reproduce frames shared by both sides of the conflict. The central location of these Parliamentary actors, especially in the e-cigarette issue, also reflects the growing importance of the EP as a political venue (Littoz-Monnet 2014, p.3).

In Stage 1 of the e-cigarette debate, the Parliamentary actors are more tightly coupled to the anti-tobacco coalition, which is comprised mostly of public health NGOs that derive their mandate from working closely in line with WHO policy and scientific expertise, here represented by an EC Scientific Committee on Emerging and Newly Identified Health Risks. This coalition has the ear of DG Sanco. The tight couplings between the NGOs and DG Sanco support document and interview data about the high levels of cooperation between the different NGO partners – they tended to work as one and pool their resources in order to get their point across more forcefully. The EPHA was instrumental in this regard, acting as an umbrella organization for public health NGOs in Brussels. The thickness of the ties between these actors and DG Sanco shows highly coherent positions. In contrast, the pro-tobacco coalition is more loosely coupled and less organized. All in all, the Stage 1 diagram shows us why it is unsurprising that the original TPD proposal as presented by DG Sanco in December 2012 took such an initially very strong stance on tobacco control and e-cigarettes. The anti-smoking coalition is much better organized at this stage, with denser and tighter links between a more diverse set of actors compared to the pro-tobacco coalition, mostly made up of tobacco interest groups pitching their argument towards DG Agriculture.

Figure 8-3a. Stage 1 of the e-cigarette debate: actor congruence.

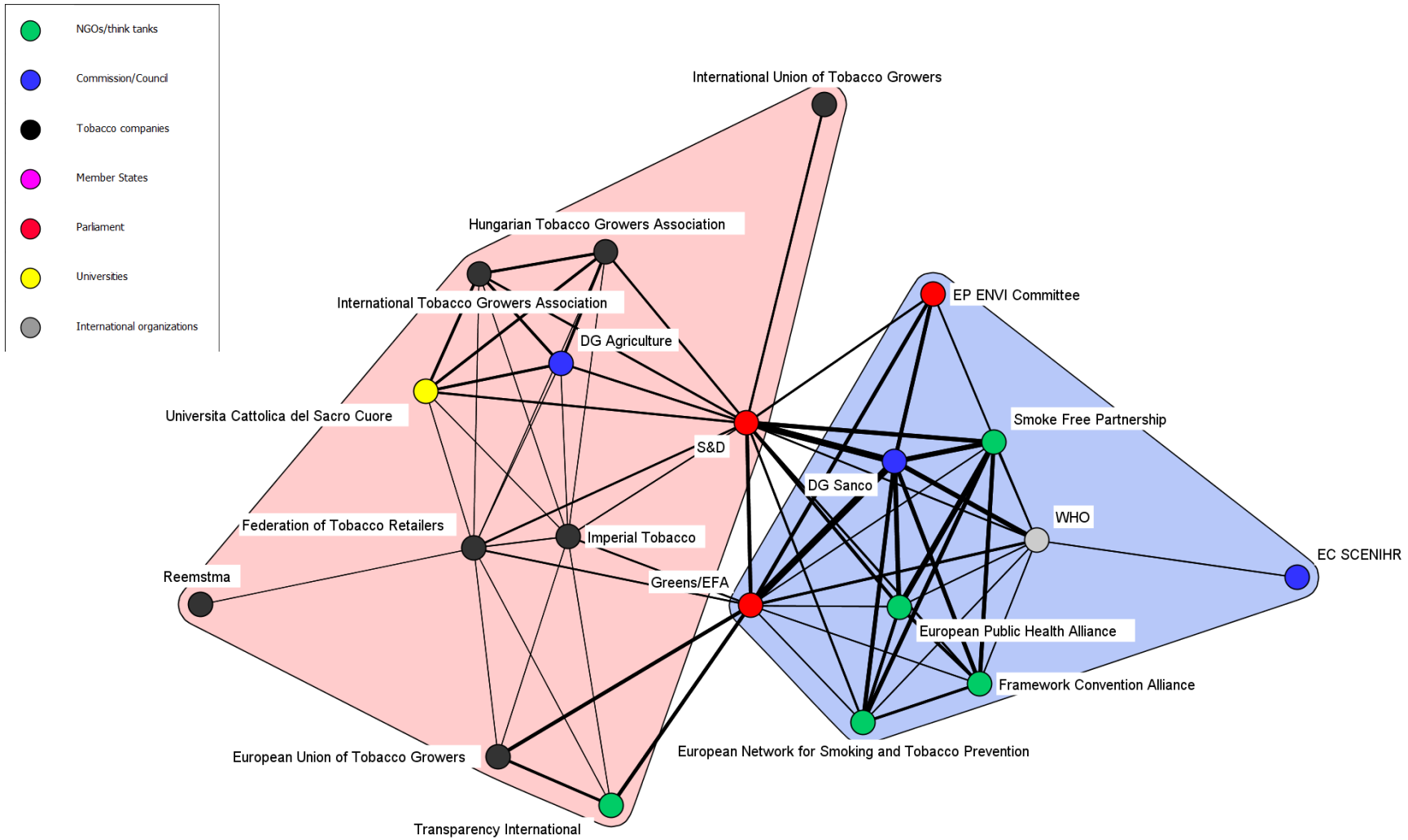
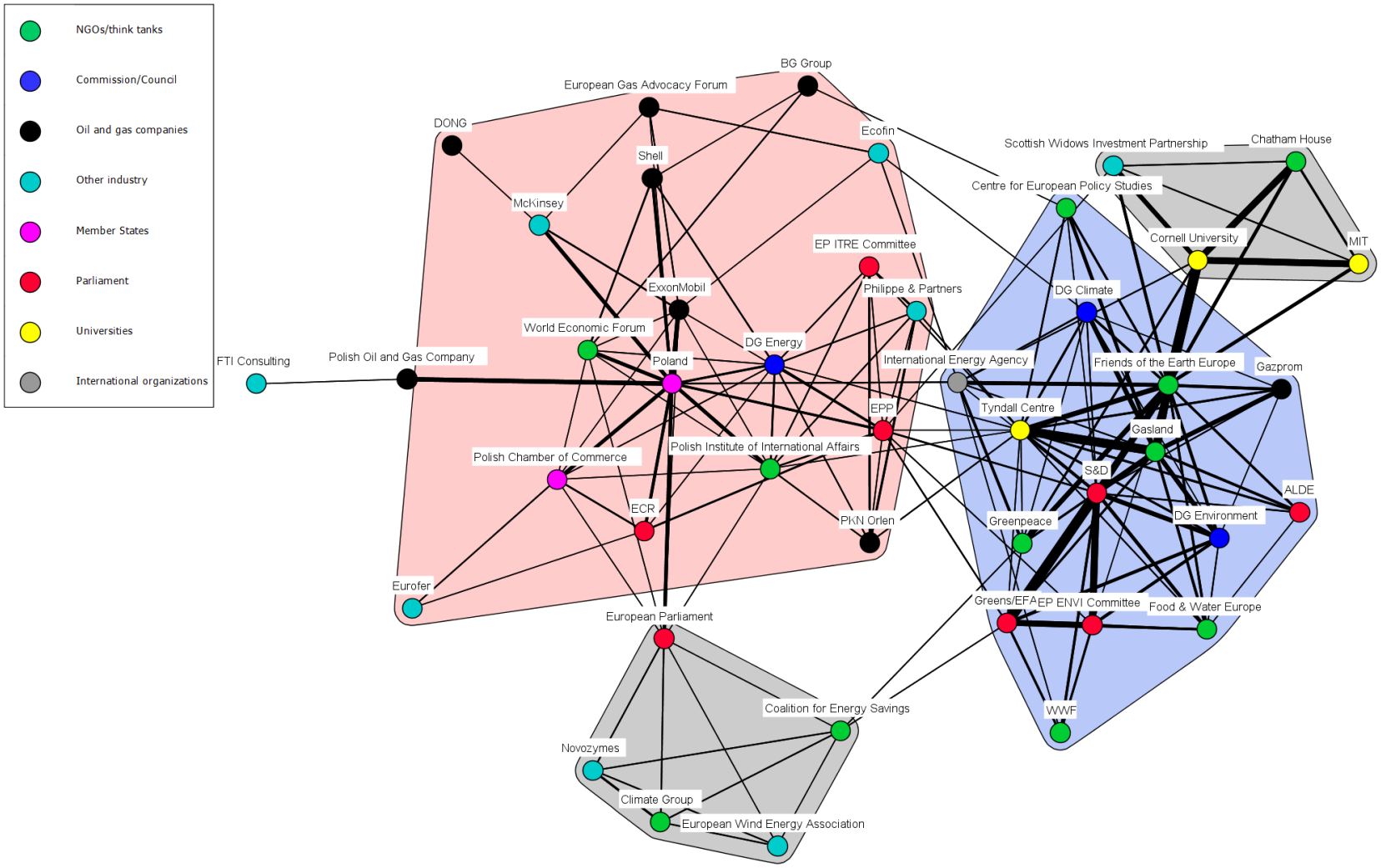


Figure 8-3b. Stage 1 of the fracking debate: actor congruence.



Moving on to the fracking debate, the diagram displays more complexity with additional actors and coalitions owing to the greater degree of exposure of this debate and its connection to a wider variety of issues. But we can still identify a clear pro-fracking coalition (depicted by a red hyperplane) and an anti-fracking coalition (depicted by a blue hyperplane) with smaller peripheral coalitions (grey hyperplanes) that are drawn on as allies. The pro-fracking coalition is centered around Poland and DG Energy as core nodes, while the anti-fracking coalition is based on a partnership between environmental groups, left and green groups in the Parliament, and DG Environment and DG Climate. Gasland put the controversial technology high on the agendas of green groups, who found the media attention expedient for mobilizing public support and getting the attention of the Parliament. On the other hand, Poland and DG Energy were consumed by visions of European energy independence (particularly from Russian gas) if the American success could be replicated. From the beginning, this meant that the stage was set for an intensely polarized and contentious debate, but one that fractured along the expected fault lines.

Of interest in the actor congruence networks is how those coalitions changed over time, both in their membership and in their relations to the peripheral coalitions. The top-right corner of the Stage 1 diagram shows a small coalition of organizations that provided the anti-fracking coalition with studies and research that could be communicated in cognitive frames. The bottom-left coalition is a collection of organizations that focus more on how fracking and natural gas fit into questions about energy saving and climate change. Statements from the Parliament (through its president, Jerzy Buzek) find common ground with these organizations in the first stage. Edge weights and network density favor the anti-fracking coalition in Stage 1, who

were also more successful in connecting to the peripheral coalitions on energy saving and environmental science. While the fracking dossier could have fallen to either DG Energy or DG Environment as lead service, the discourse coalition networks suggest that the environmental group was more successful in framing fracking as a transboundary environmental risk requiring EU-level action. The pro-fracking coalition, in this stage, was built more on the aspirations of especially Poland and the oil and gas companies active there. Judging from membership in the coalition, it seems that this more loosely coupled group of actors had a difficult time pitching the dossier as meriting EU-level attention.

In Chapter 5, on first impressions in the policy debates, I argued that there was an important difference in how the issues of fracking and e-cigarettes became policy problems: e-cigarettes were discussed in Commission-internal, routine interactions with key experts and stakeholders, but fracking was a public controversy right from the start. The network diagrams reflect that difference. The e-cigarette debate involves a smaller grouping of actors, only a few Parliamentary actors, and no Member States asserting their domestic interests yet. In contrast, the fracking debate involves many more actors, more Parliamentary parties, more universities, and a Member State (Poland). What both anti-coalitions (in blue) have in common are higher degrees of organization during this initial, agenda-setting stage. That is unsurprising given that the blue coalitions were the ones who brought the issue forward in both cases, leaving the red coalitions to organize their defenses in their wakes. So what we are seeing in the first stage is not a coincidental level of coherence among the agenda-setters, but the result of earlier interaction, cooperation and organization necessary to convince policymakers that these issues are problems worthy of attention. In Chapter 5, we learned that this interaction

took place in the Regulatory Committee meetings, among other places, in the e-cigarette debate, and on activist campaigning among environmental groups in the fracking debate. In the fracking debate, however, opponents had greater scope to contest environmental threat framings right from the beginning. I expect this means that the red coalition in the fracking debate will have an advantage in attracting additional allies in Stage 2, while this might be more difficult for the pro-tobacco group in the e-cigarette debate.

8.3.2 Stage 1: concept networks

Figures 8-3c and 8-3d depict the concept congruence networks in both policy debates in the first stage. In these networks, an edge is created between two concepts if they share an actor. Concepts that are tightly coupled through common usage by a set of actors can be interpreted as a shared discourse or narrative. Concept networks can thus be used to show what actors are talking about at specific points in time, which frames go together, and which arguments dominate the discussion. In order to construct these networks, each concept was dichotomized into a positive and negative version. Foregoing this step would have meant that concepts could be associated with sets of actors that both agree and disagree without any easy way to distinguish between the two in the diagrams. For example, an edge between the regulation and toxicity nodes could be interpreted as both positive or negative co-usage of these terms by actors. When we dichotomize the concepts by creating new "regulation – yes" and "regulation – no" nodes (and "toxicity – yes" and "toxicity – no"), we can distinguish between those who argue for or against frame contents. The diagrams below have been laid out according to node degree centrality, with more central nodes in the middle of the diagram and less central ones towards the periphery. This provides a highly legible overview of the core concepts of a

policy debate. Thicker edge weights indicate a greater number of actors sharing the two concepts. Finally, node colors reflect frame type (cognitive is blue, normative is red, and relational is green), and Louvain clusters have been drawn as hyperplanes around concepts that are used together. As with the actor networks, the blue hyperplane represents the anti-tobacco or anti-fracking coalitions' discourse, while the red hyperplane represents the pro-tobacco or pro-fracking coalitions' discourse.

Both concept congruence networks show clear evidence of a dominant anti-tobacco or anti-fracking coalition and a weakly-placed pro-tobacco or pro-fracking coalition. In the e-cigarette debate, the core frames of mistrust in tobacco companies and support for stronger regulation are tightly coupled to other anti-tobacco frames such as the toxicity of nicotine, the importance of the FCTC, and challenges to the rights of tobacco companies. Additionally, they question the economic benefits of tobacco sales and taxes compared to public health expenditures. In contrast, the pro-tobacco coalition is organized around a narrative that the TPD would unnecessarily intervene in the tobacco market and create more harm than good by encouraging smuggling and counterfeit goods. In the fracking debate, the diagram shows how the anti-fracking coalition built a narrative that connected cognitive frames of environmental and climate risks to normative frames arguing for the need for regulation, market intervention, and rapid decarbonization. The blue coalitions in both diagrams are thus following the same strategy of agenda-setting by identifying a risk through cognitive framing and coupling it to valued norms, resulting in a logical appeal to regulate in order to protect the things put at risk.

The framing strategies employed are not only meant to bring the issues onto the policymaking agenda, but they also tell policymakers specifically whose agenda they

should be placed on and how to solve the issues. For example, the anti-frackers package the arguments under the overarching rubric of the climate change challenge in order to present a clear mandate for EU action and appeal to DG Environment and DG Climate Action. The anti-tobacco coalition, meanwhile, highlight toxicity as a clear argument for DG Sanco to act. Agenda-setting framing strategies thereby contain expectations about who the relevant actors are and what they should do. The red coalitions made use of the same tactic, but with less success in the initial stage. For example, the pro-fracking coalition built their arguments primarily around the energy security frame, and made greater use of cognitive frames to convince their audience that fracking was safe and good for the economy, thereby appealing more to DG Energy and DG Enterprise & Industry. Similarly, the pro-tobacco group also organized around economic arguments as the pillar of their framing strategy. Both red coalitions prefer cognitive framing, restricting normative frame usage mostly to disputing the framing strategies of their opponents. We can also see in this early stage that both coalitions are already communicating mistrust towards their opponents, hinting at how the history of previous clashes between the NGOs and the companies matters for polarizing and entrenching the coalitions.

Figure 8-3c. Stage 1 of the e-cigarette debate: concept congruence.

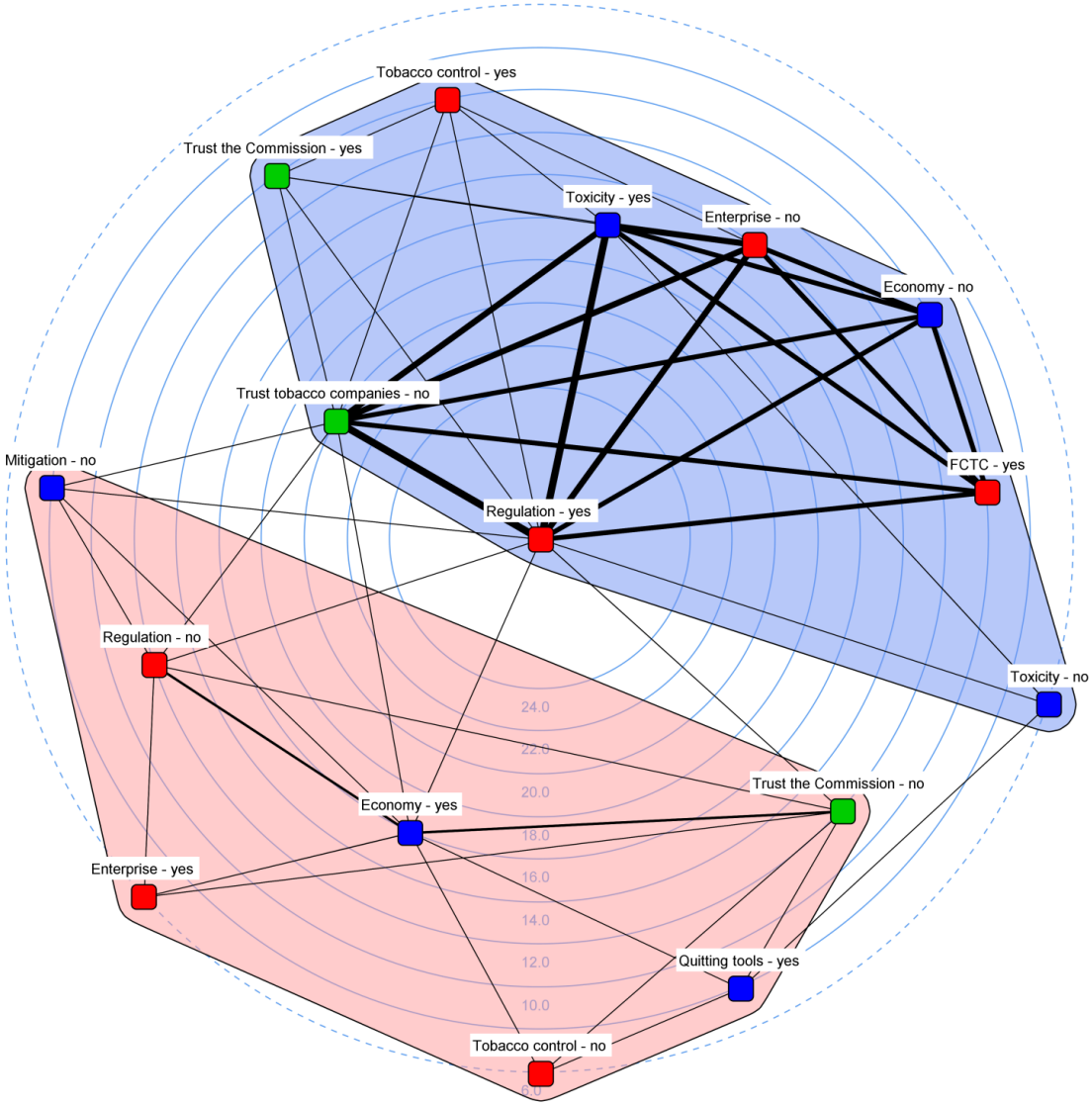
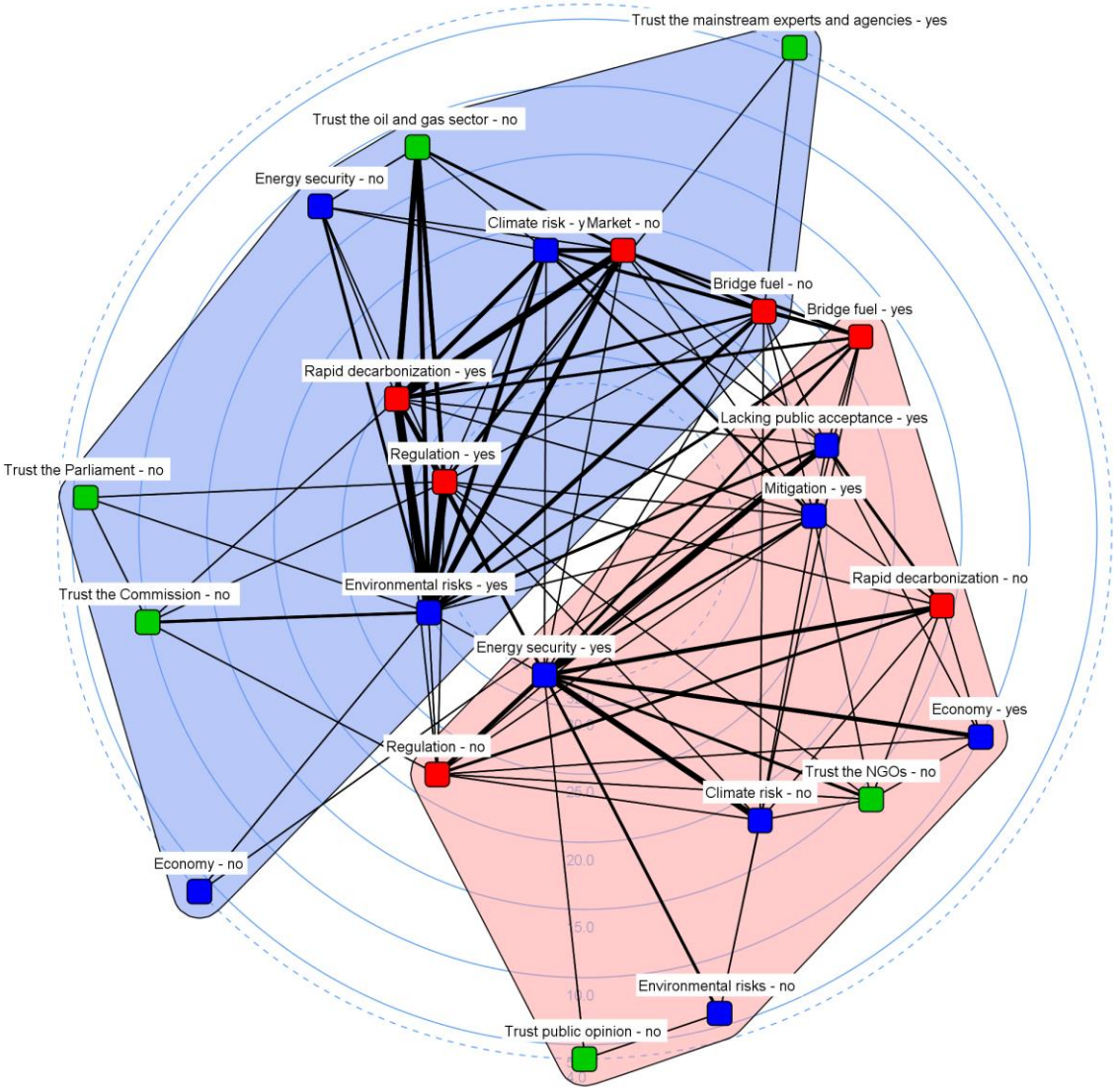


Figure 8-3d. Stage 1 of the fracking debate: concept congruence.



8.3.3 Stage 2: actor networks

Stage 2 of the conflict sees the discourse coalitions in each policy debate consolidating by drawing in more allies and reinforcing ties between core actors. Figures 8-4a and 8-4b display the actor congruence networks during Stage 2 in each debate. In comparison to Stage 1, these networks are more polarized and tighter coupled internally, suggesting that the intensity of debate is picking up in Stage 2. This is what we would expect of the transformative stage of the issue life cycle, where issues are more hotly debated as policymakers decide on a specific course of action.

In the e-cigarette debate, we see a clearer left-right polarization among Parliamentary actors, with S&D and the Greens taking a firm anti-tobacco stance, while the ECR and EFD (Europe of Freedom and Democracy) are joining the pro-tobacco coalition. The crucial party during this stage was the large, centrist EPP, which, according to interview data, could be persuaded to go either way on different parts of the Directive. Although they have ties to both coalitions, the number and strength of ties to the anti-tobacco coalition puts them closer to that camp. When we consider the density of this camp and observe the strength of ties from the NGOs to DG Sanco, S&D (who was acting as rapporteur on the dossier), the Greens, and the European Council, it is evident that a powerful array of actors stood behind an ambitious TPD. In comparison to Stage 1, the group is both more cohesive and larger.

Figure 8-4a. Stage 2 of the e-cigarette debate: actor congruence.

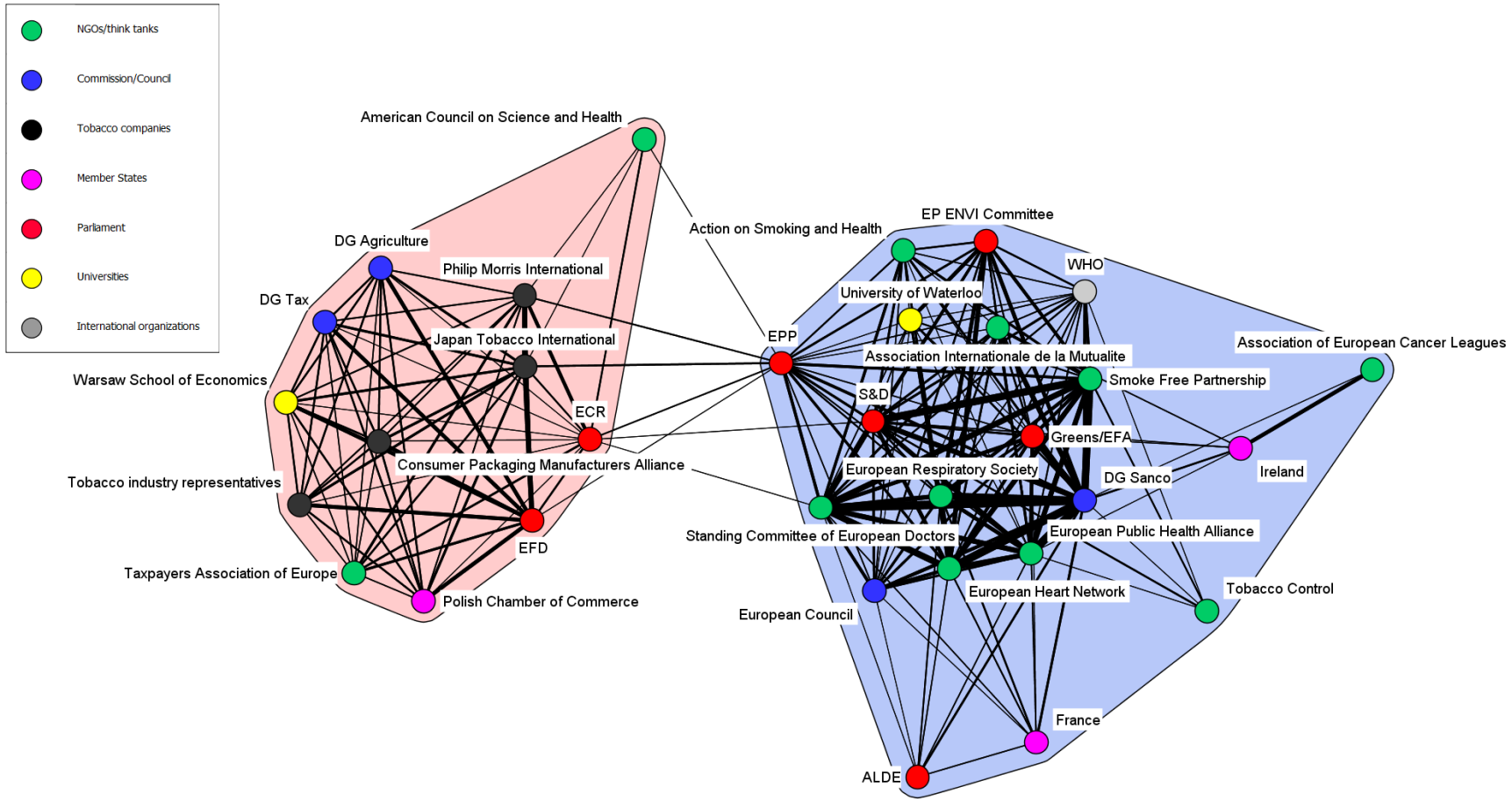
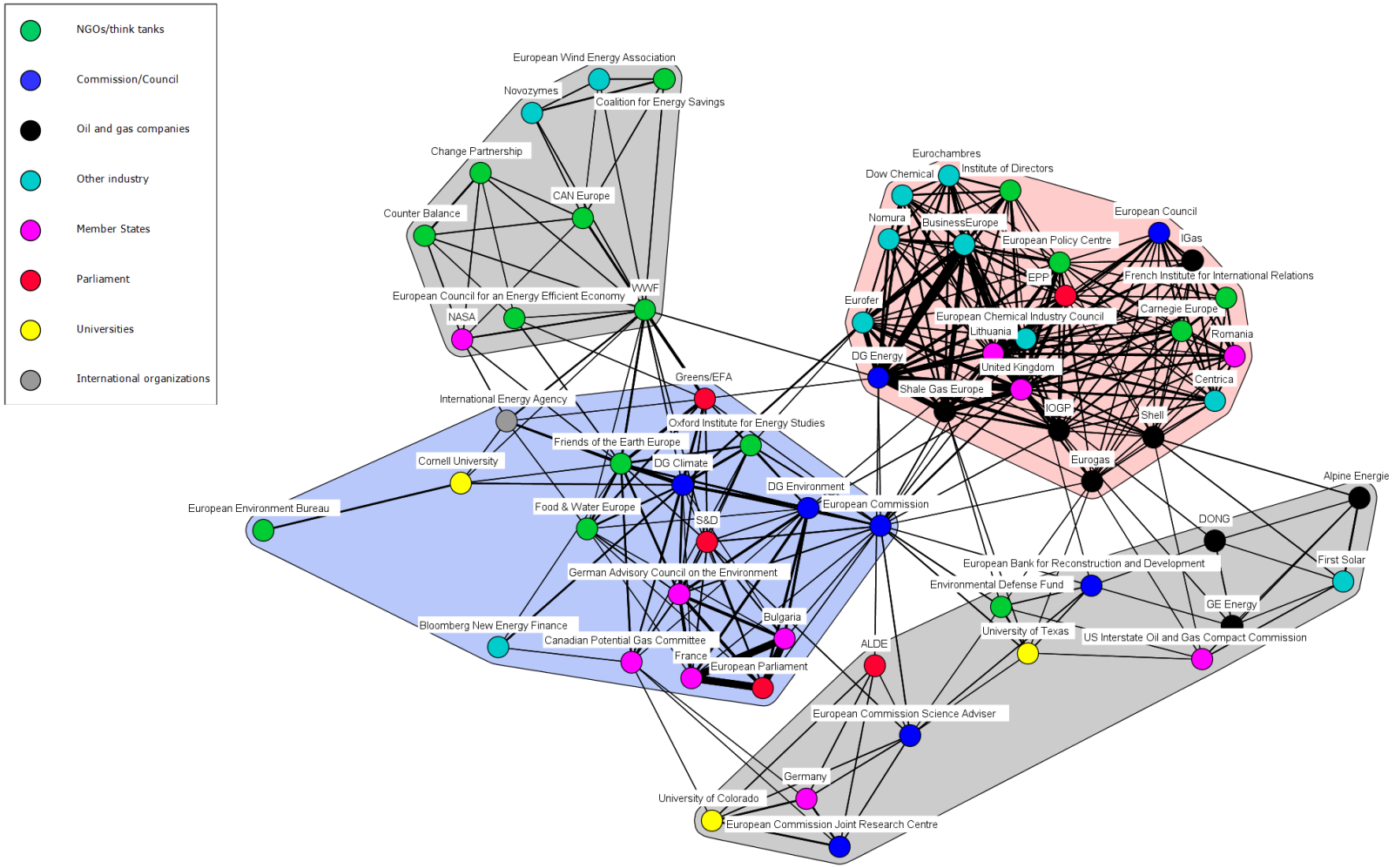


Figure 8-4b. Stage 2 of the fracking debate: actor congruence.



However, the growing sophistication of the pro-tobacco coalition, although it cannot rival the anti-group, does suggest that the increased lobbying efforts of the tobacco industry succeeded in winning over some allies and securing some concessions on the TPD (for example, the decrease in size of warning labels). Conspicuously absent from this network are the e-cigarette interests such as vaping groups and e-cigarette companies. The American Council on Science and Health, the ECR and the EFD all argued in favor of e-cigarettes, but their relative positions vis-à-vis the anti-tobacco coalition cannot explain how e-cigarettes were "saved" from pharmaceutical regulation. Judging solely from the actor network, the strength of the anti-tobacco coalition looks sure to carry the day. As stated by several interviewees, it was a "miracle" that Article 20 was voted through in its much more lenient version. Usually, when the Council, the Commission and the largest parties in Parliament agree on a course of action, that is what becomes law. So how did e-cigarettes make it through? We find no answers here. From the interviews in Chapters 6 and 7, we know that large-scale lobbying efforts by vaping communities combined with shrewd lobbying work by e-cigarette representatives played an important part in swaying the vote in the Parliament. This story seems to have escaped the attention of the popular press and cannot be deduced from the network diagrams.

If we consider the fracking debate, the picture has now changed remarkably from Stage 1. Here the diagram shows a much denser and heavily interlinked pro-fracking coalition that has secured some very impressive allies, including influential non-oil and gas industry groups or associations such as BusinessEurope and Eurochambres. The oil and gas companies have also put their weight behind Shale Gas Europe at this stage, which was to act as a united communications outlet through FTI

Consulting, a public affairs consultancy. Crucially, the coalition has succeeded in creating strong ties to both DG Energy and the European Council. Where Stage 1 featured Poland as the sole Member State in the coalition, we now find Romania, Lithuania and the United Kingdom all with an interest in fracking. In particular, the Lithuanian presidency of the Council during this stage was an important factor for bringing more attention to the domestic energy concerns of Member States in the fracking debate. In sum, the pro-fracking coalition has consolidated heavily since Stage 1 and drawn in a wider and more influential group of allies. The public nature of the controversy meant that policy actors were given an early warning that this was going to become a contentious debate and to start organizing early. In contrast, it was only during the course of Stage 2 that it became apparent that e-cigarettes would become equally controversial, leaving less time for proponents to organize in this debate.

Viewing the policy debate from the perspective of the fracking proponents, it is problematic that those tasked with drafting the legislation, DG Environment, have their feet solidly planted in the opposed coalition. However, the anti-fracking coalition is starting to look less cohesive compared both to their opponents and to their own organization in Stage 1. Their Parliamentary and Member State allies do not have much traction on the issue while it is under development at DG Environment. Furthermore, many NGO partners are rallying around groups focusing on climate change and energy savings in the top left corner, decoupling themselves somewhat from the staunchest anti-fracking groups. There are contending framings of the issue, even within the alliance against fracking. Finally, the bottom right coalition, which we can loosely identify as a science-based, pragmatic coalition (even comprising a couple of energy companies with investments in renewables and natural gas that have taken a stronger

stance on a low-carbon energy policy for Europe), is now a supplier of allies to both coalitions instead of just the anti-fracking one. Stage 2 shows clear evidence of an effective counterpunch from the pro-fracking group following their defeat in the first stage. They are much more organized and active than previously. However, the question is whether this coalition managed to dominate the core frames of the debate when DG Environment showed more affiliation to the anti-frackers?

8.3.4 Stage 2: concept networks

Figures 8-4c and 8-4d depict the concept congruence networks for Stage 2. In comparison to Stage 1, both coalitions make use of more frames, bundle them together into opposed narratives, and try to pitch them toward the central concepts around which the debates revolve. In the case of e-cigarettes, the main questions are whether regulation is needed, how young people will be affected, and whether the Commission is trustworthy and impartial or corrupted by influence from tobacco, pharmaceutical, or public health interest groups. The importance of the "Young people" frame is clear in this stage, and it supports interview data that appeals to "saving the children" are prevalent and effective in tobacco policy debates. The anti-tobacco coalition succeeded in coupling this concept much more tightly to the need for regulation and to questioning the legitimacy of the tobacco industry, as well as cognitive demonstrations through the "Mitigation" frame that were meant to show the efficacy of the proposed measures.

Figure 8-4c. Stage 2 in the e-cigarette debate: concept congruence.

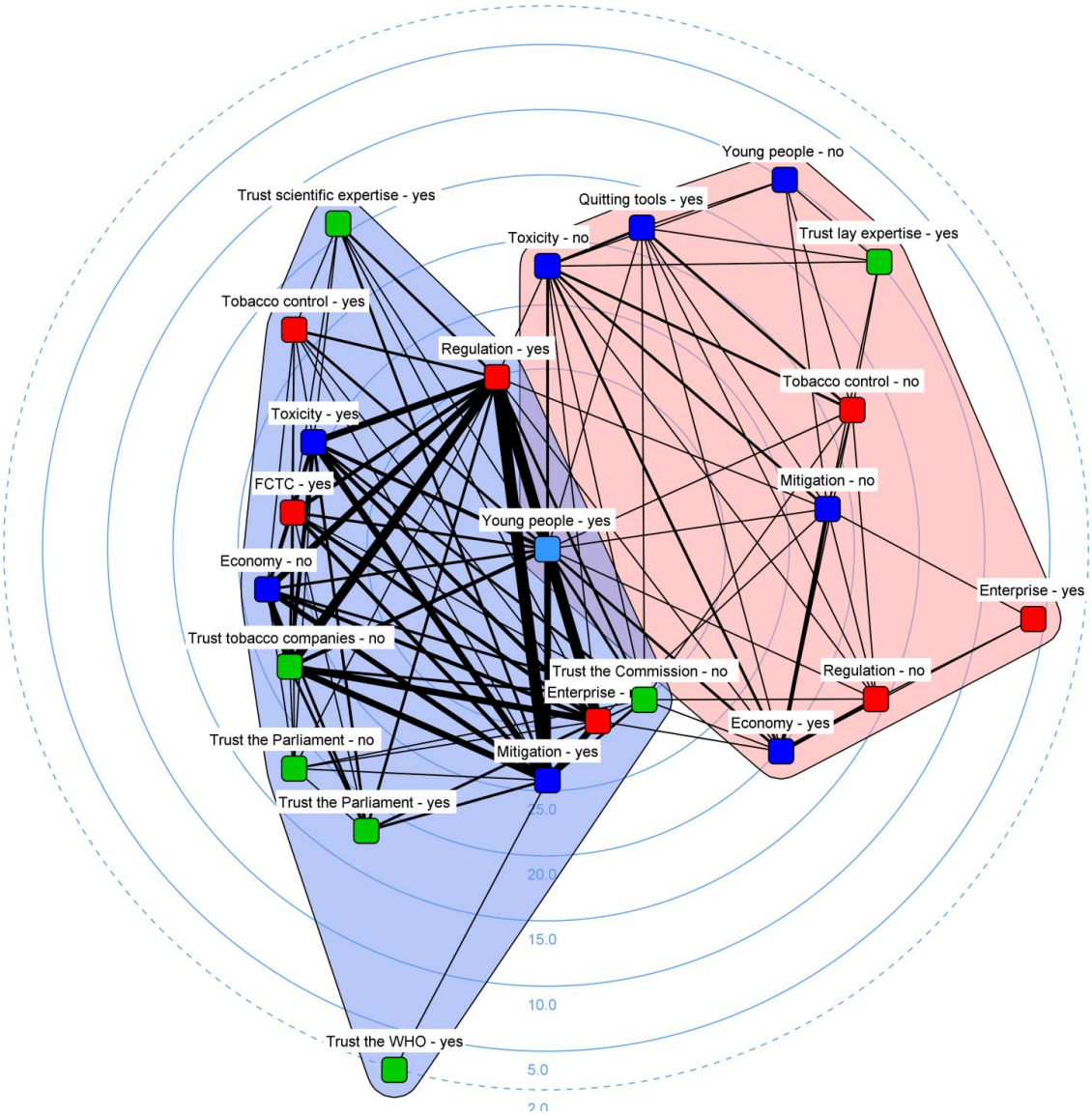
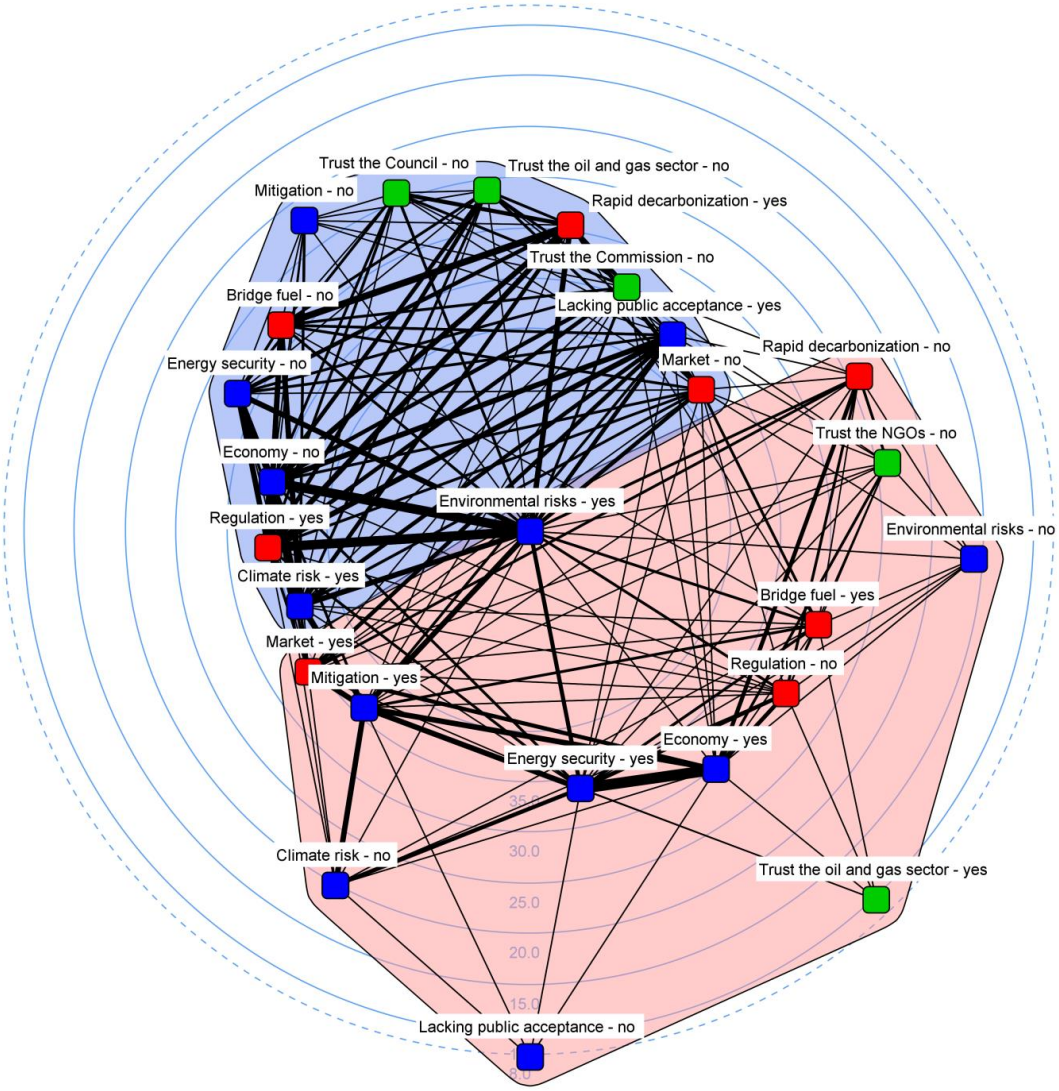


Figure 8-4d. Stage 2 of the fracking debate: concept congruence.



The edge weights and degree centrality of the core concepts indicate a much more united and active anti-tobacco coalition. Interestingly, in this stage they make much more use of relational frames than they did in the first stage, and also much more than the pro-tobacco coalition. It makes sense that the "toxic" status of the tobacco sector places them at a disadvantage when trying to communicate relationally, and their discourse is much more organized around cognitive frames instead. The scandals around "Dalligate" (the sacking of Health Commissioner John Dalli over bribery allegations) and leaks revealing the extraordinary scale of PMI's lobbying activities also gave the anti-tobacco coalition rich opportunities to deploy mistrust frames. All in all, Stages 1 and 2 of the concept congruence networks would lead us to expect very strong regulation on e-cigarettes as the public debate around the TPD negotiations was clearly dominated by a stronger anti-tobacco coalition.

Stage 2 of the fracking debate, at first glance, shows the success of the anti-fracking coalition in the first stage in framing the fracking issue as one of environmental risk above all other considerations. Occupying the center of the diagram by a fair margin, the anti-frackers tightly coupled environmental risks to climate risks and the need for regulation, while simultaneously disputing claims about potential economic or energy security gains. The lacking public acceptance of fracking was also seized upon more extensively by the anti-frackers. Considering climate change policy, this coalition also made an effort to argue for rapid decarbonization while discrediting the bridge fuel argument as an oil and gas industry ploy to lock us in to a new fossil fuel cycle.

On the other side of the divide, the pro-fracking coalition has conceded the environmental risk argument and did not try to dispute that point heavily, as can be seen from the peripheral location of the "Environmental risk – no" node. Despite recognizing

the presence of environmental risks, the pro-frackers did not concede that regulation was a good solution to the problem: self-regulation through market solutions and mitigation measures was a better option. They also disputed the climate risk frame, seeing as the bridge fuel argument featured centrally in their discourse. The primary strategy, however, was to double down on the energy security and economy dyad, and to link fracking to everything from competitiveness, to job growth, to natural gas import independence. In doing so, the pro-frackers conceded the center of the policy debate to the anti-frackers and DG Environment, and they did not try to challenge them directly. Based on the structure of the discourses, it is reasonable to suppose that if DG Environment had had sole responsibility for making the choice between a Directive and the Recommendations, they would have opted for the former. Indeed, the energy security and economy discourse, while tightly coupled internally, is less central to the Stage 2 debate overall. The purpose of this discourse was to build a strong coalition *not* to go against DG Environment specifically, but to gain friends in higher places through which they could exert pressure on the issue.

We are thus seeing a divergence in tactics during Stage 2. The pro-tobacco group spent most of its energy disputing the claims of the anti-tobacco coalition; but the pro-fracking group conceded the environmental argument and focused their framing strategies on supporting an alternative vision of fracking that cohered better with other industry groups and Member State interests. This gave the fracking proponents much greater leverage with powerful actors that could go above and beyond DG Environment. Pressure from these actors worked to make a binding directive on fracking an exceedingly difficult proposition within the political climate of the Commission. Interview data supports this. For one, there was a blocking minority within the Council,

comprised of at least Poland, the UK, Lithuania, and Romania (interviewee F9), and within the College of Commissioners, there was very little appetite for introducing binding legislation on the topic, especially due to the arguments put forward by DG Energy and DG Enterprise & Industry (F10). The industry's counter-framing strategy seemed to pay off in the fracking debate, but we are still left wondering at the weak response in the e-cigarette debate.

8.3.5 Stage 3: actor networks

In Stage 3, the regulatory outcomes have been settled. The TPD was passed without a full medicalization of e-cigarettes, but with a number of other provisions regarding flavorings, warning labels, illicit trade that the anti-tobacco coalition had prioritized. The fracking dossier did not result in a binding Directive, but in a set of non-binding Recommendations. In both cases, then, the agenda-setting coalitions did not end up with their preferred outcome. This was less disappointing for the anti-tobacco group than for the anti-fracking group. The e-cigarette was seen as more of an unknown by the anti-tobacco groups compared to the extreme demonization of fracking by the environmental groups. At the same time, information was coming to light during Stage 3 that gave more credence to the harm reduction arguments about e-cigarettes. These differences influenced how the discourse coalitions re-oriented themselves at the end of the debates.

Figure 8-5a. Stage 3 in the e-cigarette debate: actor congruence.

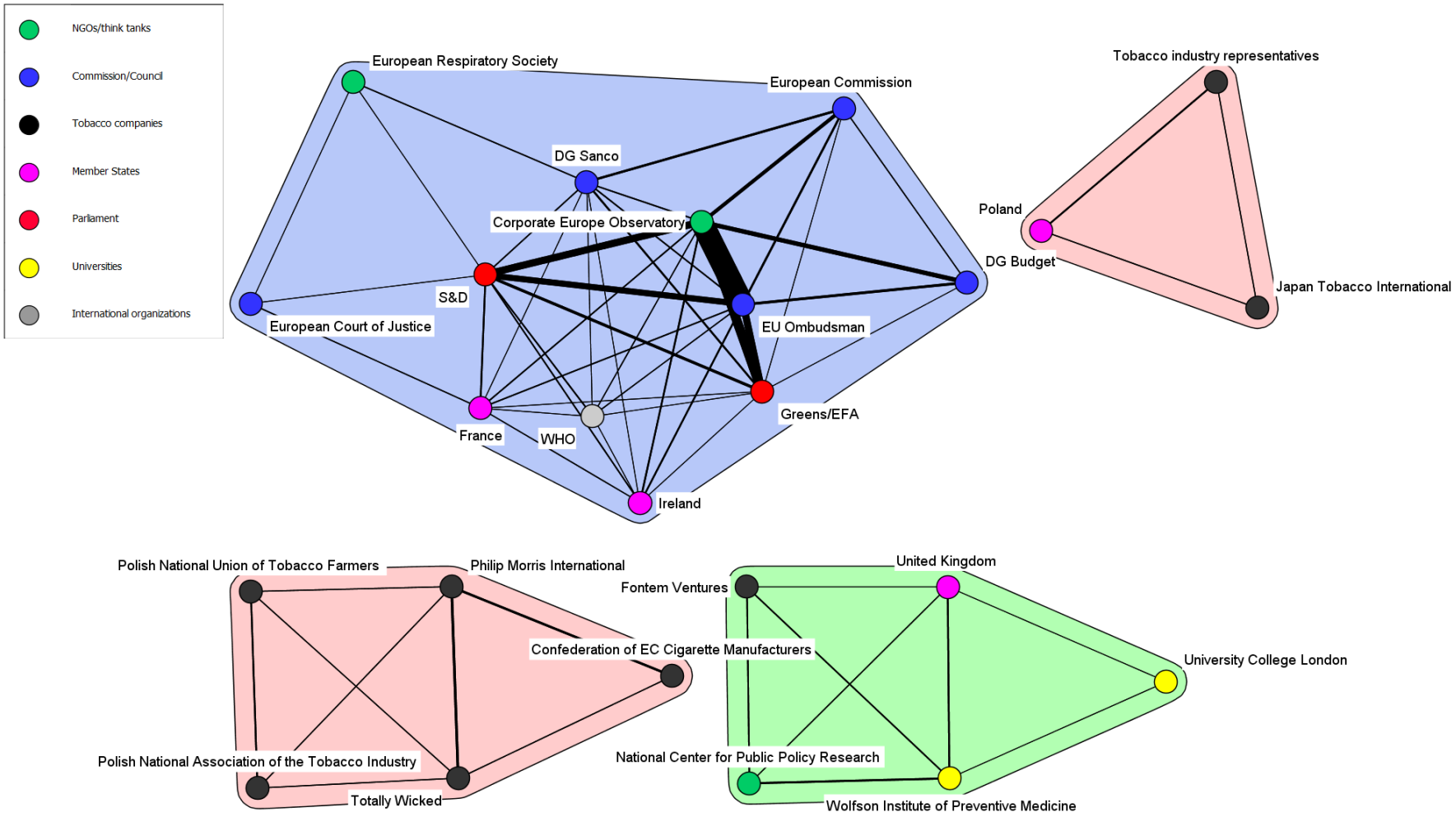
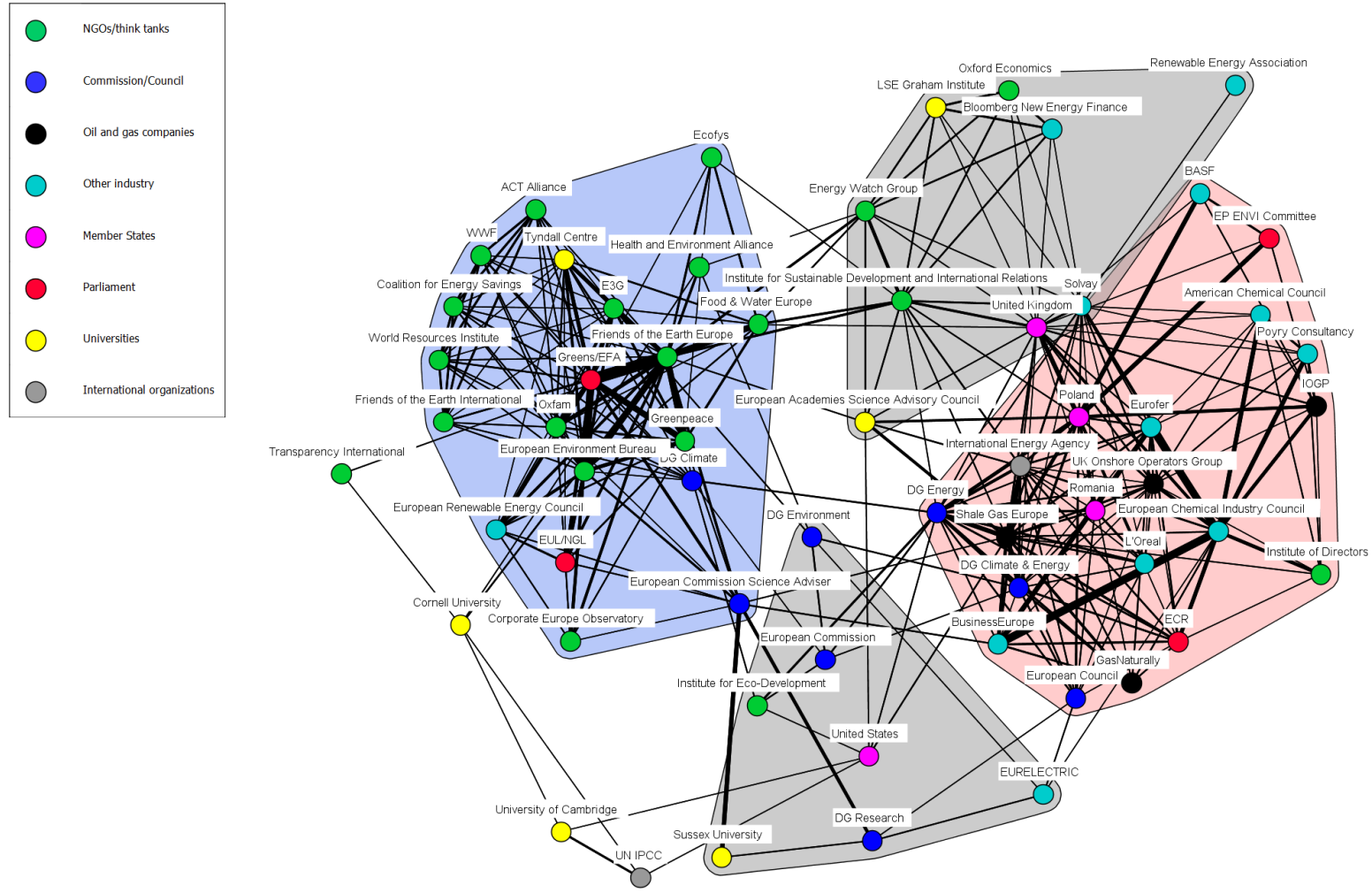


Figure 8-5b. Stage 3 of the fracking debate.



In the e-cigarette debate, the remnants of the anti-tobacco coalition, having gotten most of what they wanted in the previous stage (except for the medicalization of e-cigarettes), have little left to do in the public debate. The issue of the day at this stage is the investigation of the EU Ombudsman into the Commission's use of expert groups, brought to the light of day by the Corporate Europe Observatory and supported in Parliament by the Greens. In Figure 8-5a, we see two coalitions of tobacco companies arguing, in different ways, against the TPD and complaining about the expected negative impacts of the legislation. Philip Morris International (PMI) and Poland both challenged the TPD in the European Court of Justice. Here, also, we see the first e-cigarette company entering public debate in Brussels: Totally Wicked joined PMI and Poland in challenging the TPD (all three challenges have been struck down in court). The interesting part of this diagram is the coalition represented by the green hyperplane, where we now see a pro-e-cigarette public health coalition coming forward. A motley crew of e-cigarette representatives, researchers, think tanks and NGOs got behind an influential report from Public Health England that found e-cigarettes to be 95% safer than conventional cigarettes (McNeill et al. 2015).

At this stage of the conflict, the TPD had already been signed into EU law – the e-cigarette coalition must have been hoping to influence national legislatures to adopt the Directive in its most lenient fashion concerning Article 20. The e-cigarette coalition that we see emerging in Stage 3 may also indicate that coalition-building was already occurring during Stage 2, and we simply do not see the effects of that cooperation in press statements until Stage 3. There is, in all likelihood, a time lag between the point at which actors begin cooperating and the point at which we observe them making coherent arguments in support of each other in the press. From the interviews, we know

that such cooperation was occurring already earlier. For example, Totally Wicked already started galvanizing their customers to action in January 2013, and also engaged public relations consultants and a legal team (E15). ECITA, TVECA and EPPA (a public affairs consultancy) all started coordinating their lobbying activities during 2013 (E7, E10a, E10b, E17). Much of this work will have taken place behind the scenes, in meetings with MEPs and the Commission. With hundreds of concerned vapers already bombarding their MEPs with personal stories of vaping and emotional appeals to save the product, there was little need to engage the popular press. Public opinion, as perceived by the MEPs, was already swinging towards non-medicalized e-cigarettes. Because the opponents to e-cigarettes were mostly medical and public health experts, there were no large-scale movements or popular opinions that needed to be countered in the press. For all of these reasons, we should not be surprised to only encounter the e-cigarette discourse coalition in Stage 3.

In contrast, the Stage 3 fracking diagram in Figure 8-5b is revealing. Actor positions have clearly changed in a way corresponding to the evolution of the debate and the movements during Stage 2. Because the anti-fracking coalition had hoped for a binding Directive as a minimum, they considered the Recommendations a sub-optimal policy outcome and a failure for the group. Although the pro-fracking coalition had been arguing for a completely hands-off solution, the Recommendations were still considered a victory. The Stage 3 diagram shows DG Environment and the Commission at large[52] (except for the Science Advisor and DG Climate) abandoning the anti-fracking coalition towards a compromise area in between the two camps. Furthermore, the Juncker Commission had been elected into office, placing Miguel Arias Cañete as

[52] Statements from Commission spokespersons who were not directly affiliated with a service were coded as "European Commission".

Commissioner for both Climate and Energy, which explains the "DG Energy & Climate" node in the pro-fracking camp. The decision to merge Climate and Energy is also symptomatic of a more pragmatic (or less ambitious) turn to policies in this area. DG Environment's shift seems to be indicative of a disciplining of the directorate by the other services and the Council, as the network now shows much more coherence among the European Union-level actors. Where they were previously scattered across the network and populating diverse coalitions, they now mostly occupy central, bridging locations between the pro- and contra-coalitions. This is a movement we would expect when there is top-down, executive pressure on the services to fall into line.

The top-most coalition, also falling between the pro and contra camps, indicates another grouping of organizations supplying scientific studies that both groups drew on, but as in Stage 2, the distribution is much more equal compared to Stage 1. Poland is back alongside the United Kingdom and Romania as central nodes in the pro-fracking coalition. Interestingly, the anti-fracking coalition seems to have lost most of its partners and is now comprised almost exclusively of environmental NGOs and the Greens in Parliament. The relationship between these core actors, however, has not suffered during the course of the debate. They have drawn closer together, united in their renunciation of both the oil and gas sector and the Commission.

All in all, the actor congruence networks for the fracking debate show a story of a powerful agenda-setting action by green groups, followed by an oil and gas industry counterpunch that went over the head of DG Environment to connect with the Council, DG Energy, and other powerful interest groups, and finally, a disciplining of DG Environment by the other services. The Juncker Commission seems to have continued this trajectory towards lighter touch regulation and more attention to business interests.

As such, the actor congruence networks shed light on the dynamics of the debate by supporting the explanation for how the dossier fell to DG Environment, but also giving a more nuanced picture of how the industry fought back. The concept congruence networks for Stage 3, that I turn to next, will tell us even more about the contents of framing strategies in the aftermath of the debates.

8.3.6 Stage 3: concept networks

Figures 8-5c and 8-5d depict the network structures of the discourses in the final stage of the e-cigarette and fracking debates. As in the actor networks of Stage 3, we can observe interesting differences between the two diagrams: the two sides of the e-cigarette debate are completely decoupled from each other, while the fracking debate shows that energy security and economic arguments have displaced the earlier focus on environmental risks.

Figure 8-5c. Stage 3 in the e-cigarette debate: concept congruence.

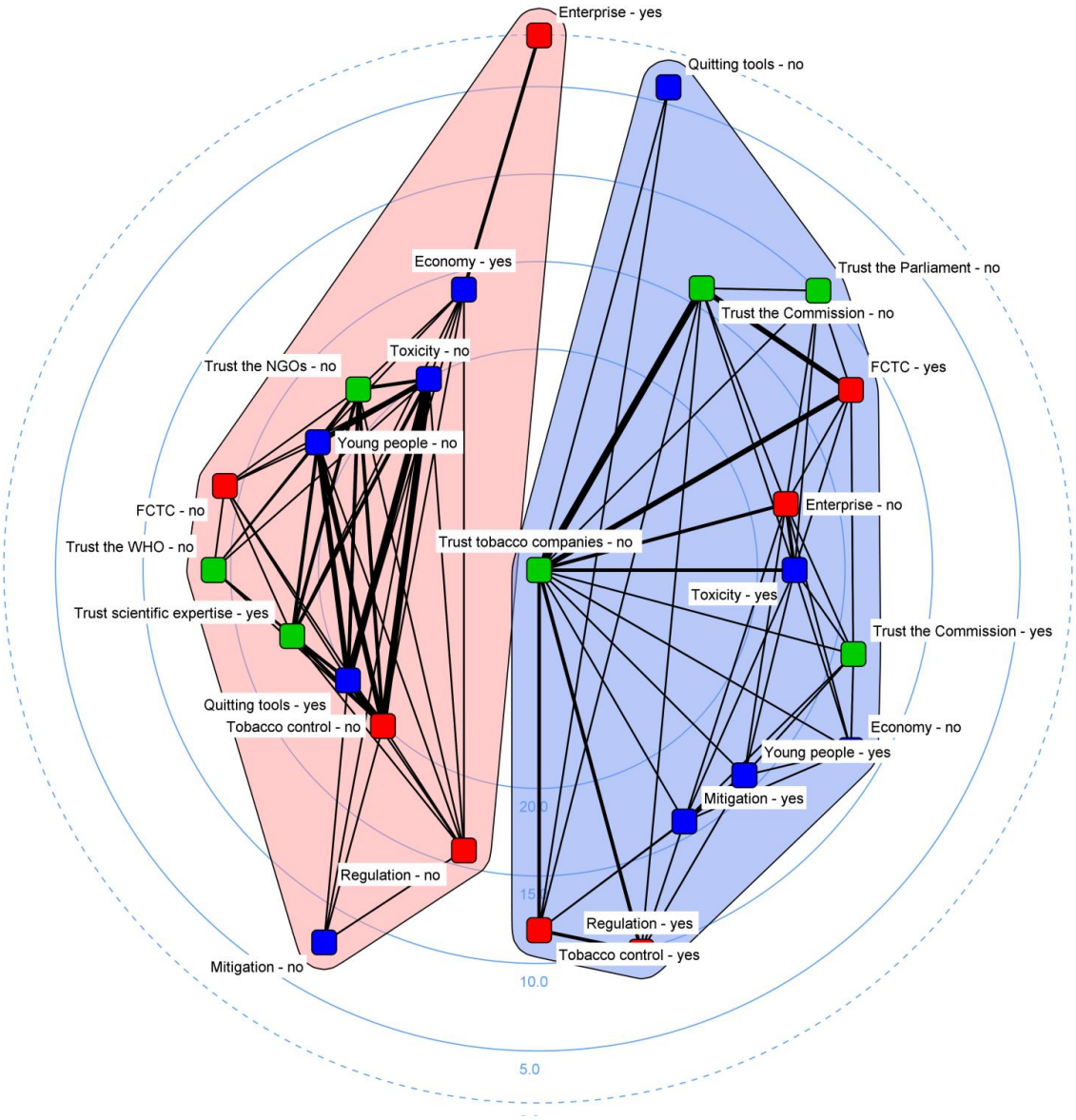
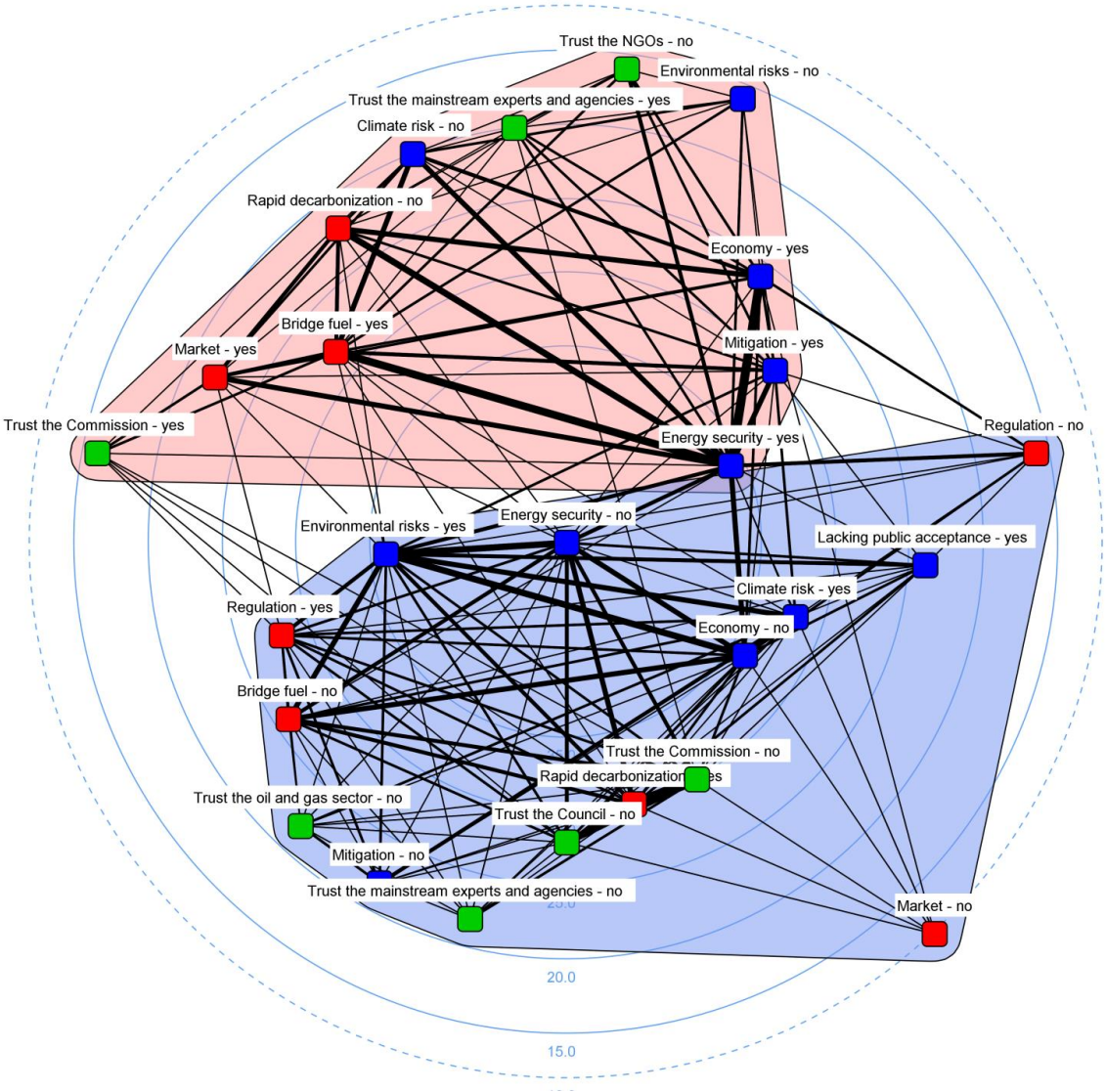


Figure 8-5d. Stage 3 of the fracking debate: concept congruence.



As we saw in the actor network, it was not until Stage 3 that the emergence of a stronger pro-tobacco coalition organized around e-cigarettes as quitting tools can be demonstrated in the public debate. In this stage, the pro-tobacco coalition is more tightly interlinked around mostly cognitive and relational frames confirming the health benefits of e-cigarettes and mistrust towards public health agencies and regulators that allowed this potential to go almost unnoticed. This is the only stage where we see the pro-tobacco group making more liberal use of relational framing, seeing as they are now in a position to attack what they see as clear mistakes on the part of the regulators. Previously, they have been entirely on the defensive in managing the social stigma of tobacco. This presents one of the most radically upending developments of the e-cigarette: that they allow vapers and producers to challenge the double stigmatization of tobacco.[53] We can see here that this translates into opportunities for new framing strategies drawing also on relational keys.

The anti-tobacco coalition does not engage in this debate – instead, discussion within this group revolved around the Ombudsman investigation previously mentioned. The complete separation of the networks at this stage shows that the debate was not resolved by the emergence of a single, dominant super-coalition that built across the opposed groups, incorporating them both into a consolidated, consensus position – this contradicts the pattern that often emerges in studies on discourse coalitions (Leifeld 2013b). During the debate, polarization increased rather than decreased. The main opponents are entrenched within clashing world views that show no signs of coalescing. It took outsiders and new market entrants working together with the fringes of the tobacco control community to identify areas of common ground, but these areas are still

[53] Double in the sense that both smoking and nicotine replacement therapy are associated with social stigma.

contested and have not greatly changed the landscape of tobacco control as of yet. While the actor and congruence networks provide some detail and context as to why the anti-tobacco coalition stood much more strongly than the pro-tobacco coalition during the TPD negotiations, they do not shed much light on how Article 20 came to take its current form. As discussed in the previous section, interview and document data supports the idea that the Stage 3 e-cigarette coalition is indicative of earlier cooperation during Stage 2.

Shifting perspectives now to the fracking debate, we have already seen in the Stage 3 actor network that the pro-fracking coalition's strategy paid off: DG Environment moved away from the anti-fracking coalition and fell in line between the other Commission agencies. The anti-fracking group now consists of almost exclusively of NGOs, with two green parties and DG Climate in the mix. When we consider the discourse coming out of this coalition, it is clearly responding to the outcomes of stage 2. Energy security and not environmental risk now occupies the central position in the debate. The anti-frackers are still reasserting the environmental risk frame, but are now forced to engage much more directly with claims about the economy and energy security. The pro-fracking coalition succeeded in changing the terms of the debate, something that was also recognized by interviewees among the green groups (F1). Although the window for regulation has passed, they are still communicating a need for it and repeating their climate change positions, probably as a way to maintain their standing with their peers and constituents.

Notably, there is an increase in the prevalence and centrality of mistrust frames in this stage too, indicating a loss of trust in the institutions that the coalition was counting on. The pro-frackers, meanwhile, have succeeded in bringing energy security,

economy and mitigation frames into much more central positions and coupling them more tightly to the bridge fuel idea. The use of trust frames can be interpreted defensively as the successful coalition backs up the Commission and the mainstream experts and agencies that supported the Recommendations. But as in the e-cigarette case, there is no sign of the discourses coalescing or differences being overcome. Rather, we see continued polarization and entrenchment leading to a breakdown in trust.

All in all, the concept congruence networks show us how actor strategies closely followed the evolution of the policy debate's discursive structure: when the NGOs succeeded in setting the agenda and initially swaying key actors within the Commission, the targeted industries countered with different strategies: the frackers focused on energy security and economy frames to attract powerful allies and win support in other venues; the vapers communicated directly to MEPs and circumvented the expert stranglehold on DG Sanco. When it proved insufficient to tackle the contra-coalitions head-on, both strategies were examples of shifting the debate towards arguments and audiences that are more amenable to your perspective. The outcome of this can only be to exacerbate the polarization and lead to breakdowns in trust.

8.4 Conclusion

I began this chapter with the goal of investigating how frame usage changed over time in the EU-level policy debates on e-cigarettes and fracking. This goal was motivated by insights from the previous chapters that the life cycles of issues matter for how policy actors approach the policy issues and craft effective strategies. In the first stage, in Chapter 5, I argued for the importance of first impressions in that the way the disruptions entered public debate influenced their onward trajectories. In the second

stage, in Chapters 6 and 7, I delved into the frame contents deployed by elite policy actors as they negotiated the topic during the most intense periods of deliberation. Here, I found that risk relations and conceptions of the public were both important for understanding actor strategies. I also found that negotiating positions could lead to nothing other than deadlock, because actors showed such strong attachments to incongruent background normative and relational assumptions. This motivated the idea to look more closely at the purely public-facing side of the debate through an analysis of newspaper articles, which, when analyzed over a sufficient duration of time, made it possible to observe shifts in frame usage as the debates evolved.

The concept congruence networks showed very clear changes from each stage to the next in discursive structure. The previous chapter suggested that relational frames should increase in importance over time, because when cognitive and normative frames exhaust their potential to normalize disruptions and settle debates, participants will resort to making claims about who to trust or mistrust as a way to modulate the credibility of their discourse. This could clearly be observed in the anti-fracking coalition: in the first stage, cognitive and normative frames diagnosed a problem and presented solutions very effectively. When they ran into opposition from a swiftly organizing counter-coalition that laid claim to economic and energy security arguments, their strategy had to change – initially towards making more of an effort to refute counter-claims, and when that failed, to communicate mistrust towards the pro-fracking coalition and the regulators who could so easily be "led astray". But the pro-fracking coalition also showed greater use of relational frames over time. The oil and gas sector shares the same "toxic" status as tobacco companies, and therefore it is not surprising to see them making very sparse use of relational communication in the first two stages of

the conflict, but in the final stage, having gotten what they hoped for, they used relational frames as a way to defend their gains and shield themselves and the regulators from what they saw as undue criticism. In this manner, we can interpret relational keying as a *modulating* component to framing strategies: signals of trust and mistrust tell us which information should be valued. This becomes even more important when actors cling to incongruent negotiating positions.

This might also explain why "venue-shopping" (Baumgartner 2007; Coen 2007; Littoz-Monnet 2014) seems such a prevalent strategy, particularly in European policy debates, marked as they are by multiple different entry points into complex and layered political opportunity structures (Richardson 2000). If you cannot convince the opposition, take the show elsewhere. According to the literature on policy networks and discourse coalitions, we should expect the coalitions that occupy central positions and dominate the core frames of a debate to carry the day (Leifeld & Haunss 2012; Carpenter 2012; Ingold et al. 2013; Hajer 1993) – but in *both* case studies presented here, the dominant coalition in Stage 2 did not get what they were hoping for and did not succeed in building an encompassing, consensus-driven coalition: the anti-frackers completely dominated the discussion on environmental risk, but did not get a binding Directive; the anti-tobacco coalition completely dominated the discussion on tobacco control, but did not get e-cigarettes medicalized. Opponents in both cases showed creativity in how to overcome the challenges of a powerful discourse coalition, and in both cases it involved venue-shopping, but of two different varieties.

In the case of fracking, venue-shopping was depicted in the actor and concept congruence networks that showed a dense industry coalition being formed with the European Council and DG Energy to back them up. They used this stronger negotiating

position within the ecology of European institutions to go above the head of DG Environment to assert themselves. The pro-frackers did not concern themselves overly much with appealing to the public, but they cemented their relations with the Council and Commission on the basis of technical expertise and economic interests. We might call such a venue-shopping strategy "going high and narrow". In the e-cigarette case, the networks could not capture any Stage 2 maneuvers to explain how the circumvention of DG Sanco happened, but we did see clear efforts at realignment and status competition in Stage 3. From the interview data, we know that direct communication from vaping activists to MEPs was a significant cause, and it is not surprising that these maneuvers did not make it into the popular press. But the mobilization of public opinion directed towards contesting Article 20 in the Parliament was very successful. In contrast to the pro-fracking strategy of going high and narrow, we might call this strategy "going low and broad". The consequence of both varieties of venue-shopping is that trust dissipates and polarization increases, and this is a tragedy for debates on disruptive innovations, marked by such high degrees of controversy and complexity. If coalitions just take their arguments elsewhere rather than try to build compromise or consensus positions, that will always leave controversies unaddressed, relations soured, and decisions vulnerable to charges of illegitimacy.

The failure of the discourse network approach to capture Stage 2 maneuvers in the e-cigarette debate also shows its limits. Potentially, this could have been overcome by including more articles from a wider variety of sources, but it is to be expected that newspaper articles will never provide completely adequate pictures of policy debates as experienced by the participants. As such, the chapter also shows the merit of triangulating research strategies to unravel complex situations through various avenues

of attack. But the discourse networks, serving as controversy maps (Marres 2015; Venturini 2012), made the structure of the debates, coalitions and discourses more legible and provided important insights into the evolution of policy debates and framing strategies over time. In the next and final chapter of the thesis, I leverage these insights and those from the previous chapters into higher-order reflection on the governance of disruption.

Chapter 9

Conclusion: harmony and dissonance in the governance of disruption

> *If we understood the world, we would realize that there is a logic of harmony underlying its manifold apparent dissonances.*
>
> - Jean Sibelius[54]

9.1 Introduction

Throughout the course of this dissertation, I have made extensive use of Goffman's musical metaphor of keys, which was adapted by Vollmer for his sociology of disruption. Having found it a useful organizing device for the wealth of information I have uncovered in the case studies, I thought it prudent to return now to a higher level of abstraction as I consider what the cases tell us about the underlying social theory guiding the investigation. The opening quote above was Sibelius' response to Mahler's assertion that "a symphony must be like the world. It must embrace everything."[55] Sibelius and Mahler, arguably the greatest composers of the twentieth century, disagreed about which theoretical structure provided the most expressive and pleasing symphonies. Should composers strive to be all-encompassing, like Mahler, rich in detail and sonically exuberant, or is there something to be said for the sparseness, directness and logical drive of Sibelius' arrangements? Sibelius made no secret of his penchant for

[54] Sibelius in conversation with Gustav Mahler, as recounted in M. Owen Lee (2005, p.197).
[55] Ibid.

cutting straight to the heart of things: "Whereas most other modern composers are engaged in manufacturing cocktails of every hue and description, I offer the public cold spring water."[56] Similarly, in social theory there is a tradeoff between richness and context on the one hand and parsimony and explanatory power on the other. A third option presents itself: like the atonal composers, we can question the script itself and abandon the search for universal laws of harmony altogether. Atonal compositions refuse to orient themselves around a tonal center, a key – is this a more accurate metaphor for the often bewildering complexity and dissonance of social life? The route that promises the most potential will depend entirely on the questions we ask. With the questions that I have asked of my material and with the answers I have provided, I can confidently offer something in-between richness and parsimony, neither cocktail nor water (beer perhaps?), but with the right set of scope conditions, the empirical regularities of the cases suggest a deeper-lying composition following some logic of harmony that we can approximate.

9.2 Theoretical implications

The most important, overarching contribution of the dissertation has been to position disruptive innovations as an important class of policy problems, meriting more attention in their own right. In the current age, marked by accelerating technological development and globalization, this class of problems is prevalent, contentious, and likely to become increasingly so in the coming decades. I have argued that disruptions as policy problems exhibit a unique combination of characteristics: they are novel, fast-moving, complex, and controversial. Consequently, they raise unexpected concerns that are not easily

[56] Sibelius on his Symphony No. 6, quoted in Gray (1935, p.56).

ameliorated by existing regulatory frameworks, they change quickly and frequently with the potential to evolve in new directions, they require technical insight and knowledge to address, and they raise the ire of the public, creating divisions and increasing the scrutiny of political processes. This set of characteristics has much in common with problems identified within technology assessment as Collingridge Dilemmas (Collingridge 1980; Morozov 2013; Schmidt & Liebert 2010): dilemmas concerning the social control of technology, where regulators are pressed into difficult decisions between acting early and forcefully, but with ignorance, or acting later with more knowledge, but with less scope to influence the direction of the innovation. I have argued that the best way to study these dilemmas in practice is to understand them as opportunities for sensemaking, wherein framing contests between experts, regulators, and other stakeholders dictate the course of social action.

To the extent that the processes of framing and counter-framing, keying and re-keying, followed predictable patterns, it seems there was a consistency for social strategizing to follow a path of least resistance, like streams flowing down mountain valleys. When policy actors first encountered the disruptions, they drew on immediately available keys from their institutional environments to make sense of what they were seeing: they diagnosed, evaluated, and prescribed in accordance with the forms of knowledge, norms, and social positions that structured their everyday, professional lives. There was no great battle of ideas among peers to overcome the uncertainty of the disruptions – rather, all policy actors readily engaged in straightforward translations of their interests into rhetorical displays meant to elicit very specific actions from regulators. As we saw in Chapter 5, those who got a head start in this were able to dictate the terms of the subsequent debate, but only to the extent that they avoided

public exposure and challenge during the initial stage. Although observers might say that both fracking and e-cigarettes look like highly uncertain propositions from the outside that could develop in a number of different ways, politics and lobbying require certainty, and the opposed coalitions were definitely certain in their communication about the harms and benefits presented by the innovations.

It is this requirement of certainty that causes regulatory headaches, because the most common mechanisms of innovation governance, such as technical risk analysis (TRA), are poorly set up to deal with opposed coalitions holding contradictory positions with equal fervor under conditions of scientific uncertainty. Technocracy functions well when experts agree and the public does not care – under different conditions, current systems come under stress (Radaelli 1999b). The escalating stress of deadlock in cognitive and normative positioning finds an outlet in relational framing. As we saw in Chapter 8, relational frames were used both to attack and defend positions in the field by modulating the value of cognitive and normative frames during stalemates. But in general, they featured more centrally and more frequently during the final stages of the policy debates. This could indicate that relational frames matter more for status competition in the contractive phase of a policy debate, because legislative outcomes have a way of "consecrating" (Bourdieu 1993) winners and losers and endowing them with status gains and losses that can be communicated more widely to secure or challenge changes in status. For example, if the Commission backs a medicalization of e-cigarettes, this is a signal to more neutral actors that those who argued for this in the first place must have gotten something right if the authorities are on their side. Those who agree with the Commission may start communicating trust frames to cement their position – those who disagree will do the opposite to discredit them and defend their

alternative. When key decisions are made by central actors, it instantly affects the relative values of keys in the field and may lead to changes in strategies.

This seems abundantly clear in the e-cigarette case, where the analysis in Chapter 8 of the final stage saw the pro-tobacco coalition drawing on new research to challenge the dominance of the WHO and the mainstream public health NGOs, who were completely committed to tobacco control as abstinence. Having not communicated nearly any relational frames previously, this was a dramatic reversal of strategy. The relational push by the coalition in this stage must be equally aimed towards discrediting the mainstream as it is towards constructing the e-cigarette as a public health benefit in itself. What relational frame usage shows, in general, is that cognitive and normative frame usage never occurs in a vacuum but is always inherently bound up with claims (implicit or explicit) about the senders and receivers that modulate the value of the information being transmitted.

It is surprising that these claims are more frequent once the legislative outcome is reached. Once policy is adopted, it influences the structure of the field by showing official recognition or disapproval of a certain set of frames, thereby consecrating or legitimating them as desirable, proper, and appropriate within a shared system of beliefs (Berger & Luckmann 1968): the Article 20 outcome in the TPD, for example, showed more lenience and understanding towards the potential public health gains that could be realized through e-cigarettes by not scheduling all of them as pharmaceutical products. This empowers the harm reduction frame, which empowers the status of those communicating these frames and discredits those who oppose them. In this manner, legislative outcomes disperse uncertainty by attaching different values to different frames, impacting the economy of concepts that policy actors pick and choose from

when crafting their strategies, and hence the relative efficacy and power of discursive positions. But having bought into certain concepts in earlier stages, actors find that these cannot be easily sold off when a consecrating action devalues them. Actors cling to their cognitive and normative frames for a variety of reasons, ranging from narrow instrumental calculation to deeply-held worldviews – they are not easily changed and certainly not without consequences. So relational frames can be seen as a way to balance the books in the economy of concepts, along the lines of: "If the Commission says that the risks of fracking can be mitigated, which I know they clearly cannot, it is because they have been bought by the oil and gas companies." Such a theorization explains the more frequent and central use of relational frames in latter stages of the debates.

If legislative outcomes in this way encourage the proliferation of relational frames, then earlier signals from regulators should do the same in a less dramatic fashion. For example, the progression from the expansive to the transformative stages in the policy debates were marked by the publication of the Commission's policy proposal or the entry of the issue onto the work plan of one of the services, both of which send signals to actors about how the Commission currently views the problem and solution at this stage in time. When a proposal for the TPD clearly schedules all e-cigarettes as pharmaceutical products, this increases the value of the abstinence frame. When the Commission grants the fracking dossier to DG Environment instead of Energy, it increases the value of the environmental risk frame. Actors were already committed to certain framing strategies in the first stage, and following these signals at the opening of the second round, we can expect (and observe) the increased use of relational frames in subsequent stages to balance earlier positions.

If the policy debate was confined to just the policy actors and the regulators, then this calculation, assessment and recalculation of framing strategies might adhere to predictable patterns, and policy actors should have an easy time of gaming the system and persuading regulators. But the economy of concepts is an open one: external events and processes impact the policy debates and change the relative weights of different strategies at different points in time in unpredictable and unforeseen directions. As Widmaier, Blyth and Seabrooke (2007, p.755) put it: "The success of any elite group engaged in persuasion is often less related to their analytic skills than to the broad mass intuitions of the moment". Particularly in the fracking debate, the European Council's Energy Summit in May 2013 propelled the energy security and economy frames into the limelight, and gave the pro-fracking coalition the boost it needed to secure its high-ranking allies and circumvent DG Environment. Additionally, the impending European elections made it less attractive to adopt a Directive on fracking that would tie the hands of the incoming Commission. In the open economy of concepts, policy actors have to be continuously scouting for "windows of opportunity" (Kingdon 1984) and changing circumstances that impact relative power positions and the expected traction of framing strategies.

What was observed in both case studies was that the pro-vaping and pro-fracking coalitions, finding the direct routes to persuading DG Sanco and DG Environment blocked by strong, agenda-setting coalitions that had moved earlier, scouted for opportunities in adjacent fields where their plays were stronger, flowing along paths of less resistance. They went about this in very different ways, however, which had crucial implications for the respective standings of experts and lay stakeholders. In the e-cigarette case, the pro-vaping coalition sought influence primarily

in Parliament, by which their position became perceived as representative of a broader, public opinion in favor of non-medicalized e-cigarettes. In the fracking case, the oil and gas companies and their industry allies sought influence within competing Commission services such as DG Enterprise & Industry and DG Energy as well as higher-level political goodwill to project fracking as a prudent and pragmatic answer to energy and economic challenges. In other words, the vapers went "low and broad", the frackers went "high and narrow". These may be construed as different varieties of venue-shopping (Littoz-Monnet 2014; Coen 2007; Baumgartner 2007), and different strategies of navigating the politics of disruption. One tries to play up public opinion at the expense of expertise, the other does the opposite. As such, these opposed strategies also reassert the central significance of securing expertise and legitimacy in the politics of disruption – interestingly, they seem to suggest that one comes at the cost of the other. This is an artifact of current governance modes and practices rather than an inherent characteristic of disruptive innovations, meaning that it is something we can address. Chapter 6, especially, brought attention to how TRA assumptions devalue lay expertise and emotions in policy debates. Because of this, both venue-shopping strategies become vulnerable to charges of illegitimacy in the contractive stage of the policy debate – something Roeser (2012) calls the pitfalls of populism or technocracy. I blame these pitfalls for the decline in trust among policy actors. Innovation governance should aspire to set this right, and I reflect on this in the next section.

9.3 Practical implications

The theoretical treatment in Part 1 of the dissertation and the case studies in Part 2 demonstrate the centrality of the politics and sociology of expertise (Radaelli 1999b;

Stirling 2008; Eyal 2013; Seabrooke 2014) to innovation governance. Getting different groups of experts and lay people to cooperate better with each other and with regulators is the most important problem that came to light from the study, and its resolution would markedly improve both the processes and outcomes of innovation governance. If the politics of expertise is the most important problem to be identified by the dissertation, then the most important finding is that the difficulties seem to manifest themselves as questions of *trust*. For example, disregarding everything else about the ways that fracking and e-cigarettes were addressed and resolved, it is a stunning and disconcerting conclusion that in *both* cases the treatment of the disruption was associated with a breakdown in trust among involved parties. Politics, at its best, should be attaining the opposite. Granted, participants did not exactly start from positions with high trust in each other, given the years of contentious policy battles between the NGOs and industries in both the tobacco and energy sectors, but the discourse networks, interview statements, and documentary record all support the finding that the normalization of each disruption was associated with deteriorating relations between participants.

For example, consider the conspiracy theories circulating in both case studies: that the Russians were paying the environmental NGOs to oppose fracking in order to keep their gas exports flowing; that the Commission's research network on unconventional hydrocarbons was in the pocket of industry; that big pharma had colluded with the Commission to corner the e-cigarette market; or that vapers were being manipulated by the e-cigarette companies. All of these point to the deep levels of mistrust between the opposed coalitions. Additionally, very few interviewees expressed anything close to satisfaction with the regulatory outcomes. In the fracking case, the

green groups were highly disappointed that their concerns were not reciprocated with binding regulation, but the oil and gas companies were also exasperated that the EU was even spending its energy on an issue they saw as unimportant and already highly regulated compared to conditions in other markets. In the e-cigarette case, the final outcome of Article 20 was seen as unscientific politicking by the tobacco control experts, and as yet another example of EU overreach by the vapers and e-cigarette companies. These compromises carry the clichéd characteristic of leaving everyone unhappy, to some extent. If EU policy in these areas is not seen as highly effective or necessary by those it targets or by the public at large, the least it could do is to foster constructive discussion between involved stakeholders. In light of current threats to EU integration and solidarity, this is doubly important.

The policy debate is constructive if it brings to light new information, clarifies which norms should apply, or builds trust among participants. Each of these corresponds to cognitive, normative, or relational keying. The policy processes of the two dossiers performed very well in the cognitive realm: through commissioned studies, stakeholder consultations, impact assessments, meetings, debates, and press attention we were provided with much clearer pictures of how vaping and fracking works and what their consequences are. The mistake that the Commission makes is thinking that this is *enough.* As we saw in the empirical chapters, no amount of further information or more accurate forecasting would have resolved the deeper-lying tensions between the opposed coalitions in the deep structures of the debates. There are limits to what can be achieved in the cognitive realm. In other words, the current regulatory setup for dealing with disruptive innovations is poorly configured for addressing disagreements within the deep structure of policy debates, on the normative and relational level. When

disruptive innovations are treated as purely technical developments, their social dimensions are left unaddressed, potentially leading to deadlock in the policy process or the passing of legislation which is perceived as illegitimate. This was less of an issue in the e-cigarette debate compared to the fracking debate, seeing as e-cigarettes were treated in the Parliament. Although it is often disparaged as an impotent talk shop, the Parliament remains the best source for democratic legitimacy within the EU system. This is especially pertinent to cases such as those created by disruptions where purely technical resolution is an inadequate option: democratic representation is the optimal arbiter of these stalemates. Were it granted more powers, the recognition of its growing importance and responsibilities may revitalize the European project as a whole.

Yet, the Commission was right in not subjecting the fracking dossier to increased Parliamentary scrutiny. The reason for this is the still low volume of fracking activity in the EU. Parliamentary debate time is a scarce resource, and priority should be given to those topics that have more wide-reaching implications for the Union as a whole. Although fracking was highly topical, the Commission should not bow to just any media-fueled controversy that comes up. But the purely technical treatment within DG Environment and the short-lived follow-up initiative of the Joint Research Centre's Unconventional Hydrocarbons Network were also inadequate for giving due consideration to the deeply polarized and intensely engaged field of stakeholders. In Chapter 3, I suggested that innovation governance should be developed as a more comprehensive policy mode/logic/imagination for dealing with disruptive innovations. The dissertation as a whole can be seen as a first attempt at filling in the blanks of what innovation governance entails by giving careful consideration to the multi-faceted aspects of the policy problems caused by disruptive innovations and how policy actors

variously make sense of them and negotiate solutions. I want to return to this theme of innovation governance now to provide some more details about the specific arrangements and mechanisms that the case studies have suggested as potentially transformative, liberating, or empowering for steering polities *through* periods of disruption.

The nature of the EU's policymaking system is very poorly equipped to rectify and adapt legislative provisions after they have been adopted. Instead, the balance of work has been tipped towards the pre-legislative phase by front-loading information gathering and consultative exercises in a gamble to cover all the bases initially and pass laws that are nearly perfect and final. Once passed, the EU institutions rarely return to the original text in the short to medium term. This is because it requires a delegation of authority from the Member States to the Commission to do so through "Delegated Acts", which are unpopular, difficult to pass, and typically seen as examples of EU overreach (Hofmann 2009; Héritier 2012). Because of the great amount of issues and actors that enter the European policy agenda, the policy cycle moves slow and takes a long time. It was thirteen years from the passing of the 2001 TPD to the passing of the 2014 TPD. It took two additional years for it to be worked into the laws of Member States. With time frames and conditions like these, there is no other option but to get things right from the beginning, but because of the complexity, uncertainty, novelty, and speed of disruptions, regulators are extremely unlikely to get it right the first time in these cases. Some of the interviewees that I spoke to specifically expressed their desire for more delegated acts at the Commission level in order to accommodate these challenges and introduce more flexibility to the legislative process. If delegated acts are unlikely in the current political climate, we need an alternative. Even in a political

climate more conducive to delegated acts, it is still a good idea to initially approach disruptions differently.

Innovation governance, as envisioned here, can contribute to this by emphasizing soft law enforced through peer pressure within multi-stakeholder governance arrangements. This requires trust between the participants to work, which is why the central aim of innovation governance should be trust-building. As detailed in Chapter 3, innovation governance is different from technology assessment, on the one hand, and risk regulation, on the other. Where the former focuses on anticipating technological impacts before they take place, the latter focuses on reacting to and mitigating these as risks once they have been demonstrated or credibly perceived. There is space for something in-between these two, where regulators partner with innovation stakeholders to steer *through* periods of disruption. The dissertation has shown how important decisions that influence the onward trajectories of disruptive innovations are taken in this interim phase between the initial marking of disruptiveness and the eventual legislative outcome from the ensuing policy debate. Given the deep divisions between stakeholders and their worsening relations during the policy debate, it is my contention that more inclusive governance forms that rely less on getting the answer right from the beginning would dramatically improve policy outcomes in a way that sees more stakeholders getting more of what they want out of the disruptive innovations.

In determining the proper arrangements and mechanisms of innovation governance, we can learn much from approaches on the forefront of transnational governance. The key parallels to link up to in the literature are the works on "orchestration" (Abbott et al. 2015; Abbott & Snidal 2009a; Abbott & Snidal 2010) and

"experimentalist governance" (Overdevest & Zeitlin 2012; Sabel & Zeitlin 2008; Sabel & Zeitlin 2010; Manning & Reinecke 2016). Orchestration is when states or international organizations pursue transnational governance activities through non-state and sub-state actors such as firms and NGOs. Similarly, experimentalist governance (which is more specific to the EU) implies a multi-level and networked architecture of rule-making where lower-level units (such as ministries or regulatory authorities) are given the freedom to pursue particular ends that are determined at the higher level (such as joint actions between Member States and EU institutions) on the condition that they report regularly on their performance and participate in a peer review to identify and compare best practices.

Outside of academia, important global actors are also beginning to flag the need for new governance modes. For example, the World Economic Forum (2016) has issued a call for "agile governance" to address rapid technological changes, where governance models learn from agile software development methods. The European Commission is also working towards updating its governance framework in the areas of "Responsible Research and Innovation" (RRI) (Lindner et al. 2016). The guiding principle behind RRI is to make European research and innovation more responsible and sustainable through reflective, multi-stakeholder processes. Expectations are converging around the need to update policy logics to face the challenges of the 21st century.

Orchestration and experimentalism has mostly been applied or scrutinized within the policy areas of climate change (e.g., Andonova et al. 2009; Hale & Roger 2014) and the environment (e.g., Henriksen 2014). What these areas have in common with disruptive innovations are the challenges of complexity, controversy, and transnational impact that lend them the same propensity to engage experts and laymen

in intensely polarized debates that cross national boundaries, and where it is difficult for regulators to ascertain the efficacy of any one measure. Experimentation and orchestration are highly suitable to such policy areas because they value delegation, cooperation and iterative problem-solving – there is less pressure on policymakers to get things right from the beginning. Repeat interactions between stakeholders within orchestrated, experimentalist arrangements are likely to build trust over time. When the stakes for decision-making are lowered, it is easier for participants to exert direct influence on the policy issues. With this sense of empowerment, feelings of futility and hostility towards opponents and central decision-makers should evaporate.

Such governance arrangements could easily have been established on the fracking and e-cigarettes dossiers. The JRC's Unconventional Hydrocarbons Network came close to the sort of arrangements we will need to see in innovation governance, but it was plagued by several problems: (1) the Recommendations had already been passed, meaning that the goals and outcomes of the Network were unclear, (2) political interventions were censored by a strict adherence to science and facts, and (3) mismanagement of Working Group chairs and committees led to a dominance of industry-friendly representatives, causing some stakeholders to protest and boycott the Network. Had something like the Network been established at an earlier stage, where political challenges were welcomed, and the member base and management better balanced, it could have had a beneficial impact on the policy debate. The same applies to the e-cigarette case: DG Sanco could have treated e-cigarettes outside the confines of the TPD according to the same principles and arrangements. That would have separated the most contentious issue within the TPD from the rest of the articles and avoided the situation where the whole Directive was nearly shelved due to disagreements about e-

cigarettes. Innovation governance is therefore a call for more inclusive and careful treatment of disruptive innovations that lowers the bar for both initial regulatory decisions and the potential to influence them. This treatment should allow disruptions to unfold under the auspices of a steering network that is flexible and sensitive to changing information, remains open to wide-ranging discussion including political and normative contestation, and facilitates trust-building and consideration of alternative viewpoints. It is a task for the future to delineate these principles into concrete political and bureaucratic measures.

9.4 Opportunities for future research

All social research inescapably raises new questions in the course of answering the original ones – so too with this dissertation. By positioning disruptive innovations as a unique class of policy problems, a number of questions about their characteristics, development and resolution automatically follow. Here, I have reflected on two cases of such problems and how they were handled at the European Union-level. In general, the work that I have begun with this dissertation should be extended in two different directions: towards other disruptions, and towards other ways of looking at them. The first of these is about bolstering the empirical record, and the second is about probing its theoretical dimensions.

For bolstering the empirical record, we can start with other recent cases of disruption in the EU. For example, media consumption has been in the process of major disruption since the first illegal file-sharing protocols were launched, as described in the story of Napster in the introduction. EU attention has turned towards file-sharing (or digital piracy of films, music, software, and other files) increasingly in recent years as a

number of studies keep confirming the substantial extent of losses to Member States' cultural industries (Wajsman et al. 2016). The EU is proposing a broad package of copyright reforms in an attempt to meet these challenges (Karp 2016). Like e-cigarettes and fracking, file-sharing debates feature sharply polarized coalitions that cling to incongruent assumptions about the nature of the problem and whose responsibility it is to solve it. Music executives believe stronger copyright enforcement to be the only solution to the problem, but internet providers and technology firms resent being made to police the content that users make available on their platforms.

Another type of piracy, illegal taxicab operation, shares many similar characteristics to this debate. The American transportation network company Uber has been active in the Single Market for only a couple of years, but its operations have already instigated protests, demonstrations, and strikes in several Member States (Fleisher 2014). Like other technology companies, Uber does not want to be held responsible for those who use the platform. It has frequently defended the position that its drivers are not employees, but partners who voluntarily make use of Uber's software and servers to facilitate ride-sharing. As such, Uber believes it should not be held to the same regulatory standards as traditional taxi companies. An element that comes up in both types of piracy, therefore, is the question of "regulatory arbitrage", which most often comes up in studies of financial regulation (Lysandrou & Nesvetailova 2015; Calomiris & Mason 2004; Houston et al. 2012; Fleischer 2010): are these innovations only successful because they are able to skirt regulation and compete unfairly? This was also a charge that the pharmaceuticals industry levelled at e-cigarettes, claiming that they were unfairly competing with nicotine replacement therapy products. Because

disruptive innovations always challenge extant regulation, regulatory arbitrage is likely to be a common feature and bears more detailed investigation.

Another way to bolster the empirical record is by leaving the EU and looking for disruptions elsewhere in space and time. Comparative studies between the EU, U.S., and Japan would be one option – comparisons between disruptions at different international organizations and transnational governance arrangements would also be welcome. Most disruptions have impacts that span boundaries and are therefore likely to be addressed in the international or transnational domains. But much regulatory life is still lived at the domestic level, and even within the EU, there are good reasons to study variation among Member State responses to disruption: Uber is banned in some places and fully endorsed in others. Yet other states have left Uber suspended in legal gray zones. What explains the variation and what are the consequences? In addition to looking at other places, we should explore the historical record of disruptions and past responses. Especially finance and economic history contains a rich record of past innovations that led to arms races between regulators and banks. The recent financial crisis is often seen as partly stemming from irresponsible trading in (and regulation of) poorly understood financial innovations such as asset-backed securities and collateralized debt obligations (Mackenzie 2011). Going further back, the history of disruptive innovations in warfare from machine guns and submarines in the past to autonomous unmanned vehicles and cyber warfare in the present seems a promising, alternative social domain in which to explore disruption.

Moving on to the theoretical dimensions of disruption, there are enticing new directions suggested by the dissertation. My investigation led me to consider the impact on regulatory practices in a predominantly discursive fashion by studying how policy

actors competed for control of the political debate. Because the politics of disruption are often about how to make sense of novel innovations and organize them within different regulatory frameworks, a discursive approach seems warranted in general to these types of cases. Control of the policy debate means that you have greater scope to exercise your particular understanding of the disruption and, consequently, the specific regulation that should apply. This discursive competition gave birth to new identities and social movements, such as the vapers and anti-frackers. The capacity of disruptions to open not only regulatory spaces, but also social and personal spaces that can be filled with new meanings and identities is an important and understudied aspect that came up in the study. E-cigarettes challenged the double stigmatization of smokers (as addicts or patients) and provided an identity that equated responsible nicotine use with pride and autonomy from both big pharma and big tobacco. Anti-fracking movements catalyzed large groups of citizens to take an interest in climate change, energy policy, environmental conservation, and their local communities. In this manner, both disruptions provided opportunities for social strategizing, for people to improve their social standing and find new meanings in their lives. Leaving the policy process out of the picture and zooming in on these psychological and sociological processes could inform more detailed theories of how disruptions matter to social life, in particular on questions of identities and movements (see for example: Rao 2009; Rao et al. 2003).

We could also zoom in on the policy process, where the investigation indicated some areas to single out for closer scrutiny. If disruptions require organizational sensemaking, then it is paramount to study in detail the formalized devices of such sensemaking: impact assessments, commissioned studies, and stakeholder consultations and meetings. How the Commission first comes to learn of a disruption and how their

understanding of it evolves (or stays the same in the face of new ideas) can be bracketed out and subjected to more detailed inspection, ideally in the form of ethnographies in order to most closely approximate and represent the lived experience of those who are tasked with addressing the disruption. In this dissertation, I did not favor any one actor over another, choosing instead to focus on the dynamics of the policy debate in its entirety, but because the Commission is undoubtedly the central actor at the hub of EU legislative activity, opening up its rich, organizational, bureaucratic life would be highly beneficial for furthering our understanding of the politics of disruption. Impact assessments, studies, and stakeholder consultations all follow rigidly defined rules of procedure, but interviewees spoke frequently of the very politicized environment in which these ostensibly technical processes played out. DG Environment was known to clearly favor a fracking directive, and DG Sanco was reluctant to endorse any form of non-medicalized e-cigarettes. How are these preferences challenged, constructed, or pursued through standard organizational procedures? In addition, how do Commission-internal politics between lead DGs, other services, and the Commission Secretariat-General play out? Future research would do well to open up the black box of the Commission during periods of disruption even wider than was attempted here.

9.5 Contributions and conclusion

In the introduction, I identified three specific goals for the study: the thick description of empirical phenomena that are important in and of themselves, a contribution to the ongoing dialogue, and the development of middle-range theory. I engaged in detail with the case studies of e-cigarettes and fracking, following them *through* the course of their disruption from the initial stages where they were brought to the attention of

policymakers to the latter stages where actors adjusted to the new regulatory environment. Giving them this degree of scrutiny revealed that the issues and actors evolve through each stage of the policy life cycle. There is no straightforward calculation that turns inputs into outputs. By providing details on the cases themselves and how they are treated, I hope that the thesis can become an important intervention in the debates on e-cigarettes and fracking. One way to do this is through the traditional academic method of dissemination through publication. In addition, the advantage of the research design employed here is that interviews with key policy actors also become a way to contribute to the ongoing dialogue by confronting interviewees with ideas and perspectives that come out of the research, as well as building relations for future contact.

In terms of theory, the core contribution was to introduce micro-sociological conceptions of sensemaking and disruption to the larger-scale processes of innovation and politics. From this synthesis, a number of novel theoretical moves could be made in pursuit of a stronger understanding and explanation of the politics of disruption. In probing the interaction between disruptive innovation and bureaucracy, I overturned the prevailing tendency to ask "what can bureaucracy do for innovation?" in order to engage with the more surprising question of "what does innovation do to bureaucracy?" I concluded that disruptive innovations that are novel, fast-moving, complex, and controversial challenge their slower-moving institutional and regulatory environments by opening regulatory spaces that necessitate sensemaking. By relying on sensemaking and framing, this allowed me to view the resulting period of disruption as playing by the rules of Vollmer's (2013) punctuated cooperation. I extended his theory to the political domain by showing how it can fruitfully organize and analyze the complex discursive

and strategic moves made by policy actors as they negotiate different meanings of the disruption and build coalitions. I also brought in relational understandings of risk to construct a typology of framing strategies, which was subsequently employed both to analyze interview material and press statements.

The key theoretical proposition from the study is that the contentious politics of disruptive innovation will tend to lead to one of two strategies of venue-shopping: either going *high and narrow* by relying on expertise to circumvent popular opinion, or going *low and broad* by relying on popular opinion to circumvent expertise. Better forms of innovation governance can address this. The findings generated here contribute to a closer union between innovation and policy studies, on the one hand, and policy studies and sociology, on the other. In the nexus between innovation and policy studies, I have identified a crucial research area that merits future attention from both traditions. In the nexus between policy studies and sociology, I have showed how Geertzian thick description coupled with network analysis and an ecological understanding of framing can provide a richer appreciation of context and process in complex policy debates while connecting sensemaking and organizational/institutional environments to policy positions and coalition-building. This approach is especially well-suited to studying the clash between fast-moving innovations and slow-moving institutions.

The coming decades will be full of disruption: advances in computing power, software algorithms, artificial intelligence, and robotics promise to shake the modern world to its core (Brynjolfsson & McAfee 2014; Thompson 2015; Schwab 2016). For example, a recent study from the Oxford Martin Programme on Technology and Employment concluded that 47% of American jobs are at risk of being automated over the next two decades due to computerization (Frey & Osborne 2013). And those are just

a small subset of technologies – consider recent game-changing advances in genetics, healthcare, energy, telecommunications, cryptocurrencies, materials production, virtual reality, and nanotechnology. "Future shock" is nothing new (Toffler 1970), and past predictions of social sea-change wrought by technological innovation have been wrong. In 1960s America, it was widely believed that technological advances especially in labor-saving devices would produce a glut of leisure time that would eventually lead to a world without work (Rosa 2013, p.131). Even before then, Keynes (1930) famously predicted that his grandchildren would only be working fifteen hours per week. Of course, that did not happen – what happened instead was that the pace of life increased, more work was created, and social structure and individual identities evolved. Technological and social developments are inseparable.

Even if future disruptions do not add up to large-scale upheaval and revolution, it would be foolish to assume that we should not expect striking transformations in social, political, and economic life. We have a say in these transformations. Technologies do not determine us. The politics of technological change, innovation, and disruption are where the transformations will be negotiated, and in these politics, we should aspire to avoid the dissonance of both technocracy and populism, seeking harmony by building trust within democratic, multi-stakeholder governance arrangements. My hope is that this dissertation will convince others of the need to study disruptive innovations as political and regulatory problems and to extend, contest, or transform the ideas contained herein. I view this dissertation as a first attempt at engaging with the kinds of problems and opportunities we can expect to encounter when dealing with future disruptions. E-cigarettes and fracking are not as dramatic as artificial intelligence or automation, but they do exert the same stresses on our politics and

bureaucracies, namely: novelty, speed, controversy, and complexity. The interaction between disruptive innovation and bureaucracy can go one of two ways in the future. If we do not prepare through sustained scholarly and practical attention, the resulting societal upheaval could be distressing. The current backlash against economic globalization that we are witnessing in the West is a testament to this. But if we do prepare, we could be standing on the brink of a world that is more abundant and just than we could ever have imagined.

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Appendix 1: Interviewees in the e-cigarettes case

Interviewee number	Organizational affiliation	Dates of interviews
E1a	Smokefree Partnership	November 25, 2014
E1b	Smokefree Partnership	November 25, 2014 June 9, 2015
E2	Greens	December 12, 2014 June 17, 2015
E3	European Respiratory Society	December 18, 2014 June 4, 2015
E4	European People's Party	December 1, 2014
E5	Alliance of Liberals and Democrats	January 21, 2015
E6	Alliance of Liberals and Democrats	January 22, 2015
E7	E-Cigarette Industry Trade Association	February 26, 2015
E8	European Heart Network	March 3, 2015
E9	Independent	March 4, 2015
E10a	EPPA	March 31, 2015 May 7, 2015
E10b	EPPA	March 31, 2015
E11	German Cancer Research Center (DKFZ)	April 1, 2015
E12a	Swedish Match	April 13, 2015
E12b	Swedish Match	April 13, 2015
E13	Fagerström Consulting	April 24, 2015
E14	Nicoventures	April 27, 2015
E15	Totally Wicked	May 1, 2015
E16a	European Smokeless Tobacco Council	May 6, 2015
E16b	European Smokeless Tobacco Council	May 6, 2015
E17	Tobacco Vapor Electronic Cigarette Association	May 7, 2015
E18	Vapourtrails.tv	May 8, 2015
E19	European Public Health Alliance	June 19, 2015
E20	Policy Matters	June 24, 2015
Total number of interviewees		**24**
Total number of interviews (those marked a and b were interviewed together)		**24**

Appendix 2: Interviewees in the fracking case

Interviewee number	Organizational affiliation	Dates of interviews
F1	Friends of the Earth Europe	November 25, 2014 April 22, 2015
F2	FTI Consulting/Shale Gas Europe	November 27, 2014
F3	Total/GasNaturally	December 4, 2014
F4	DG Environment	December 5, 2014 April 27, 2015
F5	International Organization for Oil and Gas Producers (IOGP)	December 10, 2014 April 22, 2015
F6	ExxonMobil	December 18, 2014
F7	DG Energy	December 19, 2014
F8	DG Energy	January 8, 2015 May 7, 2015
F9	DG Enterprise	January 9, 2015 April 28, 2015
F10	European Commission Secretariat General	December 1, 2014 June 18, 2015
F11	ConocoPhillips	March 3, 2015 June 26, 2015
F12	TNO	April 17, 2015
F13	AGH University of Science and Technology	April 30, 2015
F14	Total	May 5, 2015
F15	Keele University	May 12, 2015
F16	European Commission: Cabinet of the Climate Commissioner	June 11, 2015
F17	International Organization for Oil and Gas Producers (IOGP)	June 12, 2015
F18	Food+Water Watch Europe	June 19, 2015
Total number of interviewees		**18**
Total number of interviews		**25**

Appendix 3: General interviewees

Interviewee number	Organizational affiliation	Dates of interviews
G1	European Public Affairs Consultancies Association/Kreab Gavin Andersson	October 27, 2014
G2	Association of Accredited Public Policy Advocates to the European Union	January 9, 2015

Appendix 4: Frames used in the e-cigarettes policy debate

	Frame	Precaution	Prevention
Cognitive	Quitting tools	*Disagree:* Dual use, renormalization, gateway, lacking scientific data, no epidemiology studies	*Agree:* E-cigarettes are effective quitting tools, snus experience, preliminary studies and statistics
	Young people	*Agree:* E-cigarettes are attractive to young people or non-smokers	*Disagree:* E-cigarettes only appeal to current and ex-smokers
	Toxicity	*Agree:* Nicotine and tobacco is toxic and addictive, presence of harmful chemicals, quality issues	*Disagree:* Nicotine is a harmless stimulant, e-cigarettes and smokeless tobacco products are safer than conventional cigarettes
	Economy	*Disagree:* The tobacco and e-cigarette sector is already hugely profitable, benefits of fighting tobacco outweigh the costs	*Agree: S*tronger rules will hurt legally operating businesses and farmers, lead to counterfeiting and smuggling and decrease tax revenues and employment
	Mitigation	*Agree:* stronger rules will change behavior, leading to public health gains, tobacco control is working and the endgame is in reach, NRTs are working	*Disagree:* rules will be ineffective and easily circumvented, nicotine will always be popular, tobacco control isn't working and NRTs aren't working

	Frame	Avoidance	Acceptance
Normative	Tobacco control	*Agree:* Abstinence is the best strategy for tobacco control and for individuals, the only legitimate form of an e-cigarette is under pharmaceutical regulation	*Disagree:* Harm reduction is the best strategy for tobacco control and for individuals who cannot or do not want to quit, e-cigarettes should be allowed as leisure devices
	Regulation	*Agree:* the EU and public authorities should take a strong stance on urging smokers to quit and regulating the markets for tobacco and nicotine in order to save lives	*Disagree:* 'nanny states' and bureaucrats should not infringe on personal freedom or well-functioning markets by overregulating the sector
	FCTC	*Agree:* We should work to implement the FCTC	*Disagree:* The FCTC should be updated or abandoned
	Enterprise	*Disagree:* tobacco and nicotine is too dangerous to be allowed in the hands of business, and business interests should not figure into tobacco control	*Agree:* the tobacco and e-cigarette industry is a legal market that should be free to sell products that adults enjoy at their own risk, industry has a right to participate in debate
	Frame	**Trust**	**Mistrust**
Relational	Trust scientific expertise	*Agree:* Mainstream medical and public health science is the most credible source of expertise	Disagree: Mainstream medical and public health science is beholden to the interests of big pharma
	Trust lay expertise	*Agree:* Tobacco controllers should listen to e-cigarette users and companies	*Disagree:* E-cigarette users and companies are not credible and easily manipulated
	Trust the Commission	*Agree:* The Commission and DG Sanco should be allowed to settle the issue through expertise, the Parliament is too emotional	*Disagree:* The Commission and DG Sanco has too close ties to big pharma or big tobacco
	Trust the Parliament	*Agree:* The Parliament is the most democratic expression of political will	*Disagree:* The Parliament is emotional, irrational and easily manipulated

	Trust the WHO	*Agree:* Tobacco controllers should align with the WHO's position, especially as laid out in the FCTC	*Disagree:* The WHO doesn't understand e-cigarettes
	Trust tobacco companies	*Disagree:* the tobacco and e-cigarette industry are profiting off of toxic and addictive substances	*Agree:* tobacco companies provide jobs and tax revenue while providing a product for responsible adults to enjoy

Appendix 5: Frames used in the fracking policy debate

	Category	**Precaution**	**Prevention**
Cognitive	Environmental risks	*Agree:* High volume and frequency, cumulative impacts, uncertain long-term impacts, water treatment issues, flowback and seismicity issues	*Disagree:* The risk profile of fracking does not differ substantially from conventional gas extraction
	Mitigation	*Disagree:* The complexity of the risk profile makes fracking impossible to make safe and impossible to monitor	*Agree:* Risks are well understood and easily mitigated through engineering and best practices, not substantially different from conventional drilling
	Climate risk	*Agree:* High fugitive methane emissions and intensity of extraction exacerbate global warming, diverts investment from renewables, locks us in to fossil fuels	*Disagree:* Gas burns cleaner than coal, making it a low-carbon fossil fuel
	Economy	*Disagree:* Limited American success, natural gas only benefits certain industries, cannot be replicated in Europe	*Agree:* Fracking will lead to growth and jobs, increase competitiveness, decrease cost of energy
	Energy security	*Disagree:* Fracking is only projected to offset a minimal amount of imports, it's not worth it	*Agree:* gas is cheap and abundant, fracking can help Europe diversify its energy supply and reduce import dependence

	Lacking public acceptance	*Agree:* Lacking public acceptance is an obstacle to fracking in Europe	*Disagree:* public opinion at large may be against fracking, but some areas and countries support it
	Frames	**Avoidance**	**Acceptance**
Normative	Rapid decarbonization	*Agree:* The scale of the climate change challenges demands that we urgently and rapidly switch to renewables and energy efficiency	*Disagree:* Rapid decarbonization is irresponsible, too expensive, and unfeasible
	Bridge fuel	*Disagree:* We cannot afford to burn any more fossil fuels, we have more reserves than we can burn	*Agree:* We should use gas as a bridge fuel to ease the transition to a low-carbon economy
	Regulation	*Agree:* We should directly regulate fracking at the EU level through a ban or other binding measures to send a signal and protect the environment, precaution	*Disagree:* Fracking does not require specific regulation. We should help the shale gas industry flourish through self-regulation or institutional support
	Markets	*Disagree:* Top-down intervention is required to act quickly, binding energy efficiency targets, EU should intervene in domestic energy policy	*Agree:* Markets should determine the most competitive energy mix, ETS, countries should choose their own energy mix
	Frames	**Trust**	**Mistrust**
Relational	Trust public opinion	*Agree:* Trust public opinion and the public interest	*Disagree:* The public is emotional, irrational and easily swayed – they need to be educated
	Trust the Commission	*Agree:* The Commission is rational and scientific	*Disagree:* The Commission is too closely aligned with business interests
	Trust the Parliament	*Agree:* The Parliament is the most democratic expression of the people's will in the EU	*Disagree:* The Parliament is irrational and too easily swayed by emotions or captured by industry interests
	Trust the Council	*Agree:* The will of EU leaders and member states should be respected	*Disagree:* The Council only reflects the will of the strongest member states

	Trust the NGOs	*Agree:* NGOs are best placed to independently review the scientific evidence	*Disagree:* NGOs are guilty of fearmongering and spreading misinformation
	Trust oil and gas sector	*Agree:* The oil and gas sector is responsible and careful	*Disagree:* The oil and gas sector is corrupt and irresponsible
	Trust the mainstream experts and agencies	*Agree:* The mainstream of scientific opinion and the positions of credible international agencies can be trusted	*Disagree:* The mainstream of scientific opinion and the positions of credible international agencies cannot be trusted